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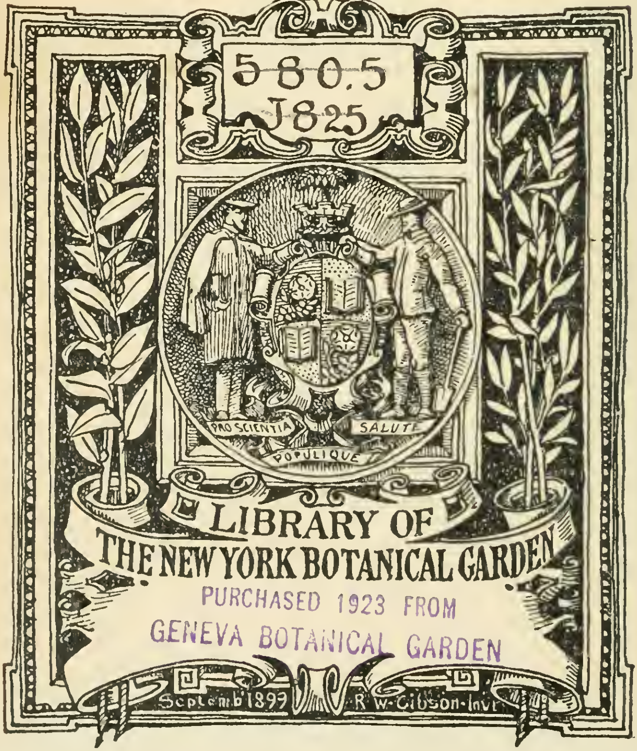
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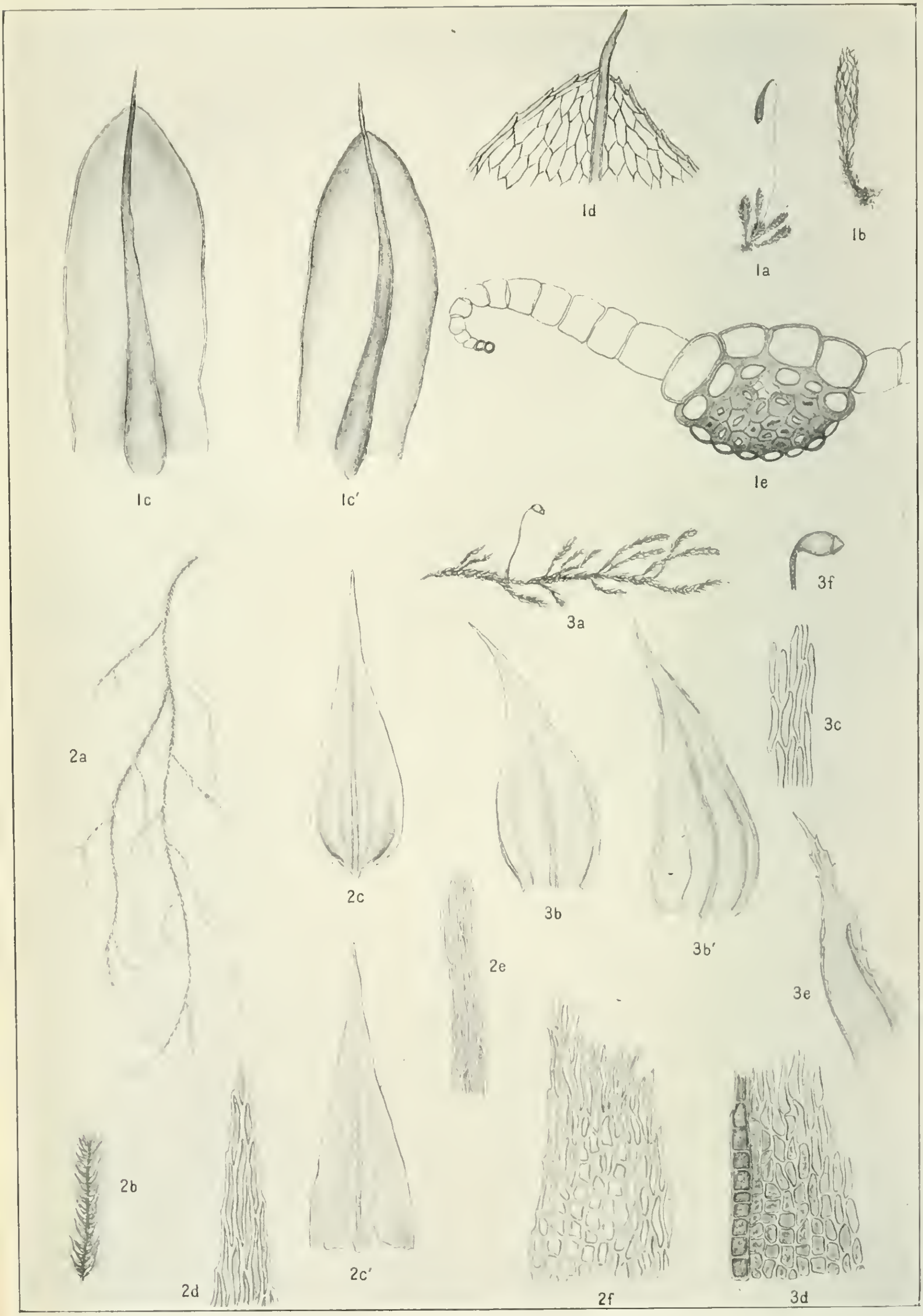
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TENERIFFE MOSSES.

THE JOURNAL OF BOTANY

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TENERIFFE MOSSES.

By H. N. Dixon, M.A., F.L.S.

(Plate 509.)

The Mosses dealt with in this article were collected by Dr. J. H. Salter, and sent to me for determination. Comprising about sixty packets, they included a comparatively large number of plants of note, three being new species, one of them of an extremely interesting nature, and several others being additions to this group of islands. For purposes of reference it will be well here to enumerate the new discoveries, an asterisk being prefixed to those new to the Atlantic Islands, and a dagger to those new to the Canaries but recorded previously for one or more of the other groups :—

†*Weisia crispata* Jur.
**Encalypta vulgaris* Hedw.
**Grimmia flaccida* Lindb.
**G. tergestina* Tomm.
**Orthotrichum rupestre* Schleich.
**Bryum validicostatum*, sp. nov.
**Aulacomnium androgynum* Schwaeg.
**Brachythecium Salteri*, sp. nov.
**Homalothecium barbelloides*, sp. nov.

Dr. Salter has written the succeeding notes as to the localities, and the conditions under which the collections were made :—

"The Mosses enumerated in the following list were collected in the island of Teneriffe during a stay of fourteen months (Dec. 1908 to Feb. 1910). The greater part of this time was spent at Guïmar, a small town and health resort situated at an elevation of about 1200 ft. upon the southern side of the island. The aspect is south-east, and, being sheltered by the central ridge of the island, the climate is peculiarly dry and sunny. No rain is expected during the five summer months. The rainfall in 1909 was ten inches, which may be taken as about the annual mean. The substratum is everywhere volcanic, largely consisting of old lava-flows. It follows that all Mosses growing in the open are exposed to extreme desiccation. Last season even the winter rains failed, so that there was severe drought in January and February of the present year. The succession of the zones of vegetation in the island is well known. Above the cultivated

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coast lands is found, at a height of from 2000–4000 ft., the 'Monte Verde,' or belt of evergreen woods, consisting largely of *Laurineæ* and *Myrica Faya*, with species of *Ilex*, *Erica*, *Arbutus*, *Viburnum*, and *Cistus*. The deep, rocky ravines called 'barrancos,' which everywhere furrow these wooded slopes, contain the springs which furnish most of the scanty water-supply of the island, and here, in dampness and shade, Mosses and Hepatics flourish luxuriantly. In the three magnificent 'barrancos' of Rio, Badajos, and Añavingo, all easily accessible from Guïmar, most of the Mosses in the following list were collected. To the Monte Verde succeed the scant remains of the pine-forests, still lying within the influence of the cloud-belt. Above the upper limit of the Pinar sterility reigns, vegetation being almost restricted to certain endemic *Leguminosæ*. There is here intense dryness of the atmosphere, strong insolation by day, a great difference between day and night temperature. Upon the Peak, at the shelter-hut (10,700 ft.), no Mosses were noted, and with difficulty a very few Lichens were found. At the Rambleta (11,700 ft.) the only moss met with was *Grimmia trichophylla*, maintained by the moisture due to condensation of steam escaping from a volcanic vent. Short visits were paid to some specially favourable localities, as to the laurel-woods of Teno at the western extremity of the island, the little patch of forest at Agua Garcia, and the luxuriant evergreen woods of Las Mercedes and Taganana, which support a cryptogamic flora unequalled elsewhere in Teneriffe. All these localities are situated upon the older formations, which evidently retain much more moisture than do the later volcanic deposits which now cover the greater part of the island."

For assistance in drawing up the following list I am greatly indebted to Mons. J. Cardot.

Ceratodon purpureus Brid. Pinar, above Ladera, Guïmar (no. 3).

Cynodontium Bruntoni B. & S. Pinar, above Ladera, Guïmar (no. 12), c. fr. The capsule is more symmetrical, smoother, and with less distinct neck than in our usual European form, and the leaf-cells more pellucid.

Leucobryum glaucum Schp. Taganana (no. 41).

Fissidens serrulatus Brid. Agua Garcia (no. 42), c. setis. An unusual form, having the cells practically smooth.—*F. adiantoides* Hedw. Agua Garcia (no. 40).

Gymnostomum calcareum Bry. germ. Monte Yzana, Guïmar (no. 7).—Var. *muticum* Boul. Barranco del Rio, Guïmar (no. 15).

Weisia crispata (Bry. germ.) Jur. Barranco del Rio, Guïmar (no. 17), c. fr. New to the Canaries. The peristome in several of the capsules is more highly developed than usual, the teeth red and quite conspicuously protruding beyond the capsule mouth; in other capsules it is paler and much shorter. The leaves are stoutish, with wide points and strong nerve, often cucullate, and with the margins widely enrolled.

Timmiella anomala Limpr. Barranco, above Arafo (no. 8), c. fr. Barranco del Rio, Guïmar (no. 23), c. fr.

Tortula atrovirens (Sm.) Lindb. Old lava-flow, Guïmar (no. 22), c. fr. This is probably the var. *edentula* (B. & S.) Par., having the peristome-teeth very short and fragmentary, and arising from a somewhat broad, papillose basal membrane. The degree of development of the teeth varies, however, a good deal, and the variety would seem to be of dubious value.—*T. muralis* Hedw. Above Arafo, about 4000 ft. alt. (no. 36), c. fr. A small form.

Encalypta vulgaris Hedw. Cumbre, above Candelaria, at about 6000 ft. (no. 30), c. fr. The form with calyptra smooth or nearly so. New to the Atlantic Islands.

Grimmia flaccida Lindb. (*G. sphærica* Schp., *Schistidium pulvinatum* Brid.). Monte Yzana, above Guïmar, at about 7000 ft. (no. 4), c. fr. New to the Atlantic Islands.—*G. tergestina* Tomm. Near Monte Yzana, above Guïmar (no. 20). Sterile, but determinable by the leaves. New to the Atlantic Islands.—*G. campestris* Burch. Risco de Fiomarcial (no. 11), c. fr. Old lava-flows, Guïmar (no. 16), c. fr. — ? *G. Doniana* Sm. Near Monte Yzana (no. 13). A sterile plant, with the habit of *G. Doniana* or nearly that of *G. arenaria*, but with usually rather wider leaves and shorter basal cells, seems perhaps to belong here; but it appears to be dioicous. It may probably be nothing but a dioicous form of *G. Doniana*, but in the absence of fruit it is scarcely safe to record it as such. *G. Doniana* has not been recorded from the Canaries. — *G. trichophylla* Grev. Rambleta, Pico do Teyde, 11,700 ft. (no. 27), ♂.—*G. commutata* Hübn. Risco de Fiomarcial (no. 9), c. fr. Recorded by Pitard and Proust from two localities on Teneriffe, but only in the sterile state.

Anæctangium compactum Schwaeg. Barranco del Rio, Guïmar (no. 24).—*A. angustifolium* Mitt. Ladera de Guïmar (no. 34), c. fr.

Orthotrichum Sturmii Hornsch. Pinar, Cumbre above Candelaria, about 6000 ft. (no. 26), c. fr. Pinar de Guïmar (no. 35), c. fr. I have recorded this plant under the above name in deference to Schiffner and others, as it is in all probability the same plant as is already recorded from several localities, of one of which Schiffner (*Hedwigia*, xli. p. 287) writes: "Die zweischichtigen Blätter lassen keinen Zweifel über die Richtigkeit der Bestimmung." Dr. Salter's plants have the leaves in the whole of the upper part bi-stratose, but the capsule, especially in no. 26, tapers at the base into the seta entirely as in *O. rupestre*. Unless *O. Sturmii* is to be separated from *O. rupestre* on the ground of the bi-stratose lamina alone (and intermediate stages even of this character are frequent), it appears to me quite impossible to define any constant concourse of characters to distinguish it from *O. rupestre*.—*O. rupestre* Schleich. On old *escobon* stem (*Cytisus prolifer*), Cumbre de Candelaria (no. 37), c. fr., *teste* Cardot. A tall, arboreal form, which is quite distinct from the plant above mentioned, and cannot be separated from *O. rupestre*. This species (apart from the above *O. Sturmii*) does not appear to have been recorded from the Canaries, or, indeed, from the Atlantic Islands.

Funaria hygrometrica Sibth. Barranco above Guïmar (no. 10), c. fr.

Haplodontium Notarisii (Mitt.) Broth. Barranco above Arafo (no. 5), c. fr.

Epipterygium Tozeri (Grev.) Lindb. Fuente la Rosa (no. 29).

Bryum argenteum var. *lanatum* B. & S. Santa Cruz Road, Guïmar (no. 25).—*B. Donianum* Grev. Guïmar (no. 32), c. fr.

Bryum (Eubryum § Trichophora) **validicostatum**, Card. & Dixon, sp. nov. (Tab. 509, fig. 1.) Cæspites *densi*, humiles, circa 1 cm. alti, pallide virides, subnitidi, ætate rufescentes. Caulis sat crassus, in sectione transversa subpentagona, fasciculum centralem magnum, rete laxum tenue, cellulas externas 1–2 seriebus minores, incrassatas, pulcherrime rubras exhibens. Folia caulina *valde conferta*, humida *regulariter imbricata suberecta*, sicca *adpressa, parum mutata, paullo contracta, nullo modo torquata*, unde caules *crassiuscule clavati teretes;* comalia densissime conferta, 2–2·5 mm. longa, 1 mm. lata, late oblongo-ovata, subobtusa, nullo modo acuminata, perconcava, marginibus per totam fere longitudinem fortiter anguste recurvis, apicem versus *denticulatis*. Rete laxum, e cellulis elongate hexagonis, 60–80 μ longis, 20–25 μ latis, parietibus firmis, haud incrassatis instructum, marginalibus in 2–4 seriebus perangustis, limbum *angustum unistratosum lutescentem distinctum* efformantibus; cellulæ apud basin haud decurrentem laxiores, rectangulares, sæpe rubellæ. Costa *validissima*, ætate purpurea, *ad basin 150–180 μ lata*, inde cito angustata, apud mediam partem folii 60–80 μ lata, apice in cuspidem lutescentem subintegrum exiens; in sectione transversa planoconvexa, dorso maxime prominens, prope basin 2–4 cellulis ventralibus magnis, ducibus 3–4 multo minoribus, fasciculo comitum parvo, stereidearum permagno, cellulis dorsalibus circa 8, transversa ellipticis, majusculis. Innovationes graciliores, foliis minoribus, minus confertis, vix comatis, aliquando paullo lenissime torquatis.

Dioicum. Seta et theca illis *B. Doniani* et *B. platylomatis* similes; operculum magnum, alte *acute* conicum. Spori 10–13 μ. Peristomium pallide aurantiacum, dentes lamellis circa 30 dorso brevissime acutissime prominentibus, endostomii membrana pallida, *prœalta*, processus *breviores*, cilia *nodosa*, vix appendiculata.

Hab. Barranco del Rio, Feb. 1909 (no. 19). Risco de Fiomarcial, Feb. 1909 (no. 6). Mons. Cardot informs me that he also possesses the same plant from the Azores, leg. Carreiro; and that the plant recorded as *B. Teneriffæ* by Schiffner [Bornmüller, no. 1673, and by implication also, no. 1680, from Monte (Tafera), Gran Canaria], also belongs here (*cf.* Schiffner, " Neue Materialen . . . . der Atlantischen Inseln," *Hedwigia*, xli., 288). Probably some other records for *B. Teneriffæ* may also properly belong to this species.

The affinities of this plant are with *B. Teneriffæ* Hampe, *B. platyloma* Schwaeg., and *B. Donianum* Grev.; but it appears to be quite distinct. *B. Donianum* differs at once in the thickened border, and the leaves usually twisted when dry, *B. platyloma* in the wide border and spirally twisted leaves. It is, I think, even more distinct from *B. Teneriffæ*, which appears to have been somewhat misunderstood. I have examined the type of *B. Teneriffæ* in Hampe's herbarium at the British Museum, and find it a plant of quite a different habit, with long, lax innovations bearing flaccid, flexuose leaves, as described by Hampe, whose note, "*B. capillari* proxima, sed foliis lato-limbatis superne dentibus aciculiformibus seu ciliformibus nonnullis longioribus vel brevioribus primo momento distinctum," quite removes it from any very close affinity with the present plant. The stout nerve, purple at the base, and the teretely imbricated branches with the leaves erect and appressed when dry, give the plant a very different appearance from any form of *B. capillare* or the allied species. *Bryum clavatulum* Card. & Dixon from the Azores has somewhat the same habit, but the leaf structure is quite different. From *B. obconicum* it differs in the stout nerve, wider, more obtuse, densely imbricated leaves, &c.

The peristome characters also may have some value. The capsules were nearly all operculate, but mostly fairly well ripened. In the two cases where the lid had already become partially separated from the capsule, I found the annulus entirely adherent to the rim of the lid, and showing no signs of splitting up or separation under pressure or after heating in water; but I can scarcely think this to be a normal character.

Mnium undulatum L. Taganana (no. 38).

Aulacomnium androgynum Schwaeg. Rock-boring made in search of water, Risco del Frayle, above Vilaflor (no. 31). The usual gemmiferous form. Genus and species new to the Atlantic Islands.

Bartramia stricta Brid. Barrancos above Guïmar (no. 2), c. fr.

Philonotis fontana Brid. By watercourse, Vilaflor (no. 33).

Pogonatum aloides (Hedw.) P. B. Evergreen woods, Teno Mountains (no. 39), c. fr.

Polytrichum juniperinum Willd. Agua Mansa (no. 1), c. fr.

Hedwigia ciliata var. *leucophæa* B. & S. Foot of Risco de Fiomarcial (no. 45), c. fr.

Leucodon sciuroides var. *Teneriffæ* Ren. & Card. Evergreen woods, Teno Mountains (no. 49).

Pterogonium gracile Sw. Barranco del Rio (no. 46); Ladera de Guïmar (no. 54).

Leptodon longisetus var. *flagellifer* Mont. Evergreen woods, Teno Mountains (no. 59*a*). This variety is totally different in its habit and size from the type of *L. longisetus* (which differs little in its vegetative characters from *L. Smithii*), and it is difficult to realize that it belongs to that species; the stems are four to five inches long, with long, often flagelliform branches, resembling slender forms of *Neckera turgida* or *N. mediterranea* in general appearance.

Neckera intermedia Brid. Taganana (no. 62); evergreen woods, Teno Mountains (no. 64).—*N. cephalonica* Jur. Evergreen woods, Teno Mountains (no. 59), c. fr.

Homalia lusitanica Schp. Taganana (no. 58).—*H. Webbiana* Mont. Taganana (no. 57). A robust form, with rigid stems, three inches long. Mons. Cardot points out that the nerve is nearly always double, while very short, while in *H. Webbiana* it is described as "nervo vix conspicuo unico"; there appears, however, to be some variation in the character of the nerve, which is often almost obsolete, as well as in the habit and size; and specimens in the British Museum collection agree well with our plant.

Thamnium alopecurum B. & S. Evergreen woods, Teno Mountains (no. 55); Agua Garcia (no. 60).

Homalothecium barbelloides Card. & Dixon, sp. nov. (Tab. 509, fig. 2.) Caules elongati, 6–10 cm. longi, infra arcte intertexti, minime radiculosi, plus minusve distanter irregulariter ramosi, *nitidi*, *sericei*, læte virides, inferne straminei, *gracillimi*, *mollissimi*, *flexuosi*, *filiformes*, subcompressi; habitu omnino *Barbellarum gracillimarum*, præcipue *B. pendulæ* (Sull.) Fleisch.

Caulis tenerrimus, in sectione transversa subrotundus, fasciculo centrali *vix ullo*, reti laxiusculo pertenui, cellulis externis in 2–3 seriebus minoribus, valde incrassatis, extremis substereideis. Folia sat conferta, sericea, madore erecto-patentia, sæpius subcomplanatula, ramea raro paullo secunda, sicca parum mutata, *parva*, e basi *valde concava* lanceolata, stricta, sensim in acumen acutissimum tenuem angustata, *pluries plicata*, 1·5–1·75 mm. longa, marginibus planis, integris vel apicem versus subdenticulatis, tenuicostata, costa longe sub apice evanida, circa $\frac{4}{5}$ longitudinem folii attingente. Cellulæ laminæ *angustissime lineares* (circa 2–2·5 μ latæ), basin versus parum mutatæ, ad angulos tantum nonnullæ breviores, latiores, subincrassatæ, irregulares, subisodiametricæ, pellucidæ, alas *parvas, male definitas nec autem obscuras* effingentes. Folia ramea minora, angustiora, superiora sæpius in subulam tenuissimam flexuosam angustatæ, tenuissime costatæ, vix plicatæ. Cetera ignota.

Hab. Evergreen woods, Teno Mountains, Dec. 1909 (no. 52).

A very pretty and delicate plant, the position of which in the absence of fruit must remain somewhat doubtful; the structure of the leaves, however, agrees very closely with that of *Homalothecium*, and it will probably prove eventually to be rightly placed here. In habit it is totally distinct from any of the species of *Homalothecium*, or indeed of the allied genera, and is an almost exact counterpart of *Barbella pendula* (Sull.) Fleisch. It is an exceedingly interesting addition to the flora of these islands.

The acumen of the leaf varies considerably at different parts of the stem, sometimes being straight and comparatively short, though nearly always exceedingly attenuated; at others, being longly subulate and often flexuose or undulate. The branches are often so attenuate as to be almost flagelliform. The leaves are somewhat amplexicaul at base, deeply concave with the margins broadly platter-edged, so that when in the natural position they appear lanceolate from a very narrow basal line; on pressure, however, they can be flattened out, and then show a broad line of insertion and an almost triangular outline, as in other species of *Homalothecium*.

Brachythecium Salteri Card. & Dixon, sp. nov. (Tab. 509, fig. 3). Cæspites *densissimi magni tumidi*, sat robusti, flavo-virides, *haud nitidi*; caules 3–4 cm. longi, procumbentes, irregulariter vel subpinnate ramosi; rami ascendentes, suberecti, valde conferti, inæquales, *crassiusculi, obtusi.* Folia caulina imbricata, arcuato-decurva; ramea *arcte imbricata,* e basi cordato-ovata sensim vel abrupte acuminata, acumine plus minusve attenuato, sæpius semi-torto, dense serrulato (caulinorum acumen tenuius minus serratum); omnia *concavo-carinata, pluries profunde plicati,* marginibus *ad basin late, superne angustissime distincte reflexis.* Costa ad basin valida, $\frac{2}{3}$–$\frac{3}{4}$ folii longitudinem æquans, apice sæpe *in 1–3 spiculos dorso folii prominentes* exiens. Areolatio sat densa, e cellulis lineari-vermiculatis, 40–50 μ longis, ad infimam basin et ad angulos paucis latioribus subquadratis instructa.

Autoica. Fl. masculi numerosi, tumidi, inter femineos mixti. Folia perichætialia erecta, convoluta, apice subulato vel loriformi flexuoso vel subsecundo. Seta 1–1·5 cm. longa, rubra, *scaberrima.* Theca *parva, breviter turgide ovata,* cernua; exothecii cellulæ parvæ, incrassatæ, collenchymatæ, rectangulares angulis rotundatis. Operculum breviter conicum. Peristomium aurantiacum; dentes externi sat breves, lamellis circa 20 intus prominentibus, endostomii membrana circa $\frac{1}{2}$ longitudinem dentium æquante, flavida, ciliis 2–3 prælongis, tenuissimis, minime tamen fragilibus, brevissime appendiculatis. Spori 12–16 μ.

Hab. Fuente la Rosa, April, 1909 (no. 56).

A very distinct species, most nearly allied to *B. trachypodium*, but entirely different in its habit, the absence of the glossiness that is a marked character of that plant, the turgid subjulaceous branches, the markedly recurved leaf-margins, less sharply toothed leaves, and small capsules, which are abundantly produced. The apex of the nerve usually ends in one to three serrulations, showing as short spinulose projections from the back of the leaf, as is frequently the case in *B. trachypodium* and *B. Starkei.*

Brachythecium rutabulum B. & S. Ladera de Guïmar (no. 47). —*B. purum* (L.) Dixon. Taganana (no. 63). — *B. illecebrum* (Schwaeg.) De Not. Barranco del Rio, Guïmar (no. 44*a*), c. fr.

Eurhynchium Teesdalei (Sm.) Schp. Barranco Badajos (no. 14). It is on record for La Palma, but I have not seen any record from Teneriffe. — *E. circinatum* (Brid.) B. & S. Ladera de Guïmar (no. 48). —*E. meridionale* (Schp.) De Not., forma. Barranco del Rio (no. 44), c. fr. A robust plant with strongly striate, rigid leaves, more like a small form of *E. striatum.* I take it to be the *E. canariense* (Hampe & C. M.) referred to by Ren. & Card. in Bull. de l'Hérb. Boissier, ii. 438 (1902).

Rhaphidostegium substrumulosum (Hampe) Card. (*R. Welwitschii* Schp., *Sematophyllum auricomum* Mitt.). Agua Garcia (no. 28), c. fr.

Amblystegium riparium (L.) B. & S. Barranco del Infierno, Adeje (no. 43). Fuente Madre, Vilaflor.

EXPLANATION OF PLATE.

Fig. 1. *Bryum validicostatum*. *a*, plant, natural size. *b*, stem (dry), × 3. *c*, leaf viewed from front, × 20. *c′*, do., viewed from back, × 20. *d*, leaf apex, × 50. *e*, nerve section at base, × 80.

Fig. 2. *Homalothecium barbelloides*. *a*, plant, natural size. *b*, part of stem, × 2. *c*, leaf in natural condition, × 20. *c′*, do., under pressure, × 20. *d*, leaf apex, × 200 (the cells are drawn slightly too wide). *e*, upper cells, × 200. *f*, alar cells, × 200.

Fig. 3. *Brachythecium Salteri*. *a*, plant, natural size. *b*, *b′*, stem-leaves, × 20. *c*, upper cells, × 200. *d*, alar cells, × 200. *e*, apex of branch leaf, × 40. *f*, capsule, × 3.

FURTHER NOTES ON THE FLORA OF FLINTSHIRE.

By A. A. DALLMAN, F.C.S.

DURING the past year I have been largely occupied in the investigation of the flora of Denbighshire in its various aspects, and a vast amount of information has now accumulated: of this I hope shortly to give some account. Owing to this large extension of my original undertaking, it has not been practicable to devote very much time to personal field work in Flintshire during this period, although a little has been accomplished. This, however, has been largely compensated for by the kindness of various friends and correspondents, and, as a result, a considerable amount of new material has been acquired, and it may perhaps be as well to place some of this on record. The present contribution is in the nature of a supplementary county list, in the sense that the records quoted represent extensions of distribution, or in some instances additions to the county flora. In preparing this list I have only utilized a fraction of the material to hand, and so it must not be regarded as exhaustive, but rather as supplementary to papers on the subject which I have contributed to this Journal (see Journ. Bot. 1907, 138; 1908, 187, 222; 1910, 40, 53, 90). Consequently the present contribution is entirely and designedly of a systematic character. Work dealing with local ecology, Welsh plant names and plant lore, floral biology, and other aspects of the subject, has occupied much time, but such is purposely excluded. These phases of the undertaking are reserved for detailed treatment in the *Flora of Flint and Denbigh*, which is in preparation.

The present affords another pleasant opportunity of more formally expressing my indebtedness to several friends and contributors. To Miss F. M. Thomas and Dr. E. J. Haynes Thomas, of Chester, I am under special obligations for much valued help and co-operation. Mr. R. H. Day, as a resident observer, has rendered valuable aid in connection with the vegetation of the Cwm area, and in various other ways. Mrs. New (Backford) and Miss Cummings (Caerwys) are jointly responsible for an acceptable series of records of plants observed in the vicinity of Caerwys. Miss M. Jones, of Tan-yr-ywen, Llanfynydd, has also gone to some trouble to keep me supplied with observations and material dealing with the flora of her district; Miss H. M. Williams (Aston) has supplied some useful notes chiefly on plants occurring in the neighbourhood of Shotton and Aston. Mr. W. Hodge, of Northwich, has contributed some very welcome observations, including notices of several species hitherto unrecorded for Flint. I have also to thank Mrs. Macdonald (Cwm), the Rev. J. Evans Jones and Mrs. Evans Jones (Dyserth), the Rev. W. Wright Mason (Bootle), Dr. W. B. Russell (Colwyn Bay), Mr. W. Whitwell, F.L.S., and Dr. J. W. Ellis, of Liverpool.

Plants which are additions to the county list are indicated by an asterisk.

With few exceptions, the plants in the following list were observed in 1910.

Clematis Vitalba L. Four Crosses, Meliden Road, near Dyserth, *Mrs. Evans Jones*. Lane from Gronant, up hillside, *Day*. Cerrig Heilyn Lane, Dyserth, 1910. Hedge between Dyserth Castle and the Meliden Road.

Ranunculus Baudotii* Godr. Plashes, near the lighthouse, east side, Point of Aire, *Hodge*.—Var. **confusus* Godr. In a ditch by the road leading from Rhyl, west end, across the marsh to Rhuddlan, *Hodge*. — *R. Lenormandi* F. Schultz. Pond near Gwern-to, above Llanfynydd, *Jones* (sp.). Near Cwm, *Day*.—*R. sardous* Crantz. Seen in two stations in the neighbourhood of Rhyl, *Hodge*.—R. arvensis* L. Several plants as a casual on the Cop near Saltney, *Thomas* (sp.).

Helleborus fœtidus L. Plentiful in Maes Mynan Woods, May, 1908, *G. Loftus & H. S. Marsh* (photograph). Nant-y-Ffrith, only one plant seen, *Thomas*.

Aquilegia vulgaris L. A single plant seen near Cymmau, Ffrith, *Thomas*. Hedge-bank by road south of Newmarket, *Day*.

Berberis vulgaris L. Plentiful about the ruins of Old Hawarden Castle, *Thomas*. Near Truly Farm, Babell, near Caerwys, *New*.

**Nymphæa lutea* L. In the pond belonging to Higher Kinnerton Vicarage, *Thomas*.

**Papaver Argemone* L. Seen in two stations in the vicinity of Rhyl, *Hodge*.

Corydalis claviculata DC. In a little wood on the edge of the meadows by Tan-yr-ywen, Llanfynydd, *Jones* (sp.).

Alyssum maritimum L. The station-yard, Rhyl, evidently an outcast or escape, *Hodge*.

**Erophila præcox* DC. Steep limestone rocks in Nant-y-Ffrith in almost inaccessible situations. Only a few plants seen, *Thomas*.

Sisymbrium officinale Scop. var. **leiocarpum* DC. Several plants on the Cop at Saltney, in suspicious company, 1909.

Helianthemum canum Baumg. Plentiful on the western side of the Gop, above Gop Farm, Newmarket, *Day*. A frequent and typical plant of the carboniferous limestone of the littoral portions of Flint and Denbigh.

Lychnis Githago Scop. Cornfield between Saughall and Queen's Ferry, *Williams*.

Stellaria aquatica Scop. By the Clwyd near Rhyllon, below St. Asaph.—*S. nemorum* L. Marshy meadow near Caerwys, *New.*

Sagina apetala L. By the drive, Hawarden Park, *Ellis.*

Spergularia salina Presl. River-bank between Shotton and Queen's Ferry, *Williams.*—*S. marginata* Kittel. Dee shore between Sandycroft and Queen's Ferry.

Hypericum montanum L. A solitary plant seen in lane between Marian mawr and Marian Mills, *Day.*

Malva rotundifolia L. Roadside by the Common, Caerwys, *New.* In several stations near Rhyl, *Hodge.* Plentiful about Newmarket, *Day.*

Geranium pratense L. In the quarry by the railway station, Caerwys, *Hodge.* Field between the railway and the Alyn, a third of a mile or so south of Rhydymwyn Station. A few plants just behind the west platform of Rhydymwyn Station.

Erodium maritimum L'Hérit. At the foot of the sandhills on the land side at Gronant, *Hodge.*

**Oxalis corniculata* L. Occurs in quantity in a semi-wild state as a garden weed in the grounds of Dyserth Vicarage.

**Impatiens biflora* Walt. Western end of the "H" Bridge, Rhyl, *Hodge.*

Euonymus europæus L. On the left-hand side of the road, about a hundred yards after passing the keeper's cottage, on the way to Tryddyn from Tan-yr-ywen, *Jones* (sp.). Cerrig Heilyn Lane, Dyserth, *Day.*

Melilotus alba Desr. On the Cop near Saltney, *Thomas.*

Trifolium medium L. Near Hawarden.—*T. hybridum* L. The Cop, *Thomas* (sp.).—**T. filiforme* L. Occasionally on the Rhyl Golf Links, *Hodge.*—*T. striatum* L. On the Common, Caerwys, *New.*

Ornithopus perpusillus L. Hawarden Park, *Williams.*

Vicia gemella Crantz. Plentiful on a bank by Ty-coch Farm below Cwm.—*V. hirsuta* Gray. Banks by the Aston Hall Colliery line, *Williams.* Between Buckley Junction Station and Kinnerton Station, *Thomas.* Railway embankment near Caerwys, *Hodge.*

Geum rivale L. Meadow by Tan-yr-ywen near Llanfynydd, *Jones* (sp.). On the right-hand side of the road from Tryddyn to Nerquis, immediately after passing Carreg Llech, *Jones.* Amongst alders in some swampy ground by a streamlet south of the railway, above Aston Hall Farm, *Williams.*

Poterium officinale Hook. fil. Meadow between the Gop and Gwaenysgor, 1894, *Herb. Day.*

Saxifraga granulata L. About twelve plants noticed by children from Llanfynydd School while looking for "nature study" specimens in a wood near Tryddyn village in May, 1909, *Jones* (sp.). A very rare plant in Flint and Denbigh.

Chrysosplenium alternifolium L. Nant-y-Ffrith Woods, *Thomas* (sp.). On the Flintshire side of the River Cegidog between Ffrith and Cefn-y-Bedd, *Thomas.*

Cotyledon Umbilicus L. On the right-hand side of the little hill after passing the Old Smithy near Gwern-to, *Jones* (sp.). Wall in lane near Cefn-y-Bedd Station, *Thomas*. Rocks in quarry by Rhuallt.

Sedum Telephium* L. Limestone quarry near Caerwys Station, *Hodge*.—*S. album* L. Disused quarry at the base of the carboniferous limestone range, on the side of the south-east road from Prestatyn, *Miss Olive Franklin* (sp.).—S. anglicum* Huds. On a dry bank at the Rhyl end of the road leading from Prestatyn, out of Bastion Road, near the site of a burnt-down stackyard, *Hodge*. I sent several clumps to Mr. Day, of Cwm, from the neighbourhood of Dolgelly, where this plant is very plentiful. At that time this species had neither been seen in nor recorded for Flintshire, although carefully sought for. With a view to naturalizing it in the county, these clumps were planted on an old wall on Mynydd Cwm (Cwm Mountain) immediately above and south of Bryn Goleu. These plants appeared to be thriving when I visited this locality in September.—*S. reflexum* L. Roof and walls by Marian Mills, near Newmarket, *Day*. — *S. rupestre* L. Limestone rocks in Nant-y-Ffrith, *Thomas*. Occurs here at an elevation of about 900 feet.

Myriophyllum alterniflorum DC. In the plashes near the Point of Aire lighthouse, at the shore end of the road leading from Talacre Station, *Hodge*.

Epilobium parviflorum Schreb. Seen in two stations near Rhyl, *Hodge*. By a little pond near the footpath between Plassau and Newmarket, *Day*.

Bryonia dioica Jacq. Lane leading to the Dee Bridge at Shotton, *Williams*.

Smyrnium Olusatrum L. Plentiful on roadside about a third of a mile from Meliden towards Prestatyn.

**Carum Petroselinum* Benth. & Hook. f. Sandy bank on the Rhyl Golf Links, *Hodge*.

Myrrhis Odorata Scop. Plentiful in a field adjoining the inn at Cymmau, and extending some distance down the road towards Cefn-y-Bedd, *Thomas*.

Scandix Pecten-Veneris L. Near Aston, one plant only, *Williams*. The Cop, near Saltney, *Thomas*. Cornfield near Rhyl, *Hodge*.

Fœniculum vulgare Mill. Seen in three places in the vicinity of Rhyl, *Hodge*.

Œnanthe fistulosa L. Very common on the marsh between the Golf Links, Rhyl, and the railway, *Hodge*. Pond in field by roadside about a mile east of Rhuddlan, towards Cwm.

Silaus flavescens Bernh. In three places in fields on the farm called Rhydorddwy-wen, near Rhyl, *Hodge*.

**Caucalis daucoides* L. Several plants as casual on the Cop at Saltney, *Thomas* (sp.).

Valeriana dioica L. Near Llanfynydd, *Jones* (sp.). Swampy ground by a streamlet south of the railway, about Aston Hall Farm, *Williams*.

Dipsacus sylvestris Huds. On Rhydorddwy-wen Farm, near Rhyl, *Hodge*. Quarry behind the post-office, Ffrith, *Hodge*. On the embankment of a bridge which crosses the railway below Gronant.

Antennaria margaritacea Benth. & Hook. fil. An odd plant near Buckley Station, *Thomas* (sp.).

Inula Helenium L. In fair quantity in a field near Dyserth, *Rev. J. Evans Jones* (photograph).

Bidens tripartita L. In a farm pond on the roadside, Town Ditch, *Thomas*.—**B. cernua* L. Marshy place about half a mile from the shore at Gronant, *Hodge*.

Anthemis Cotula L. and **A. arvensis* L. In a field near the electrical generating station, Rhyl, *Hodge*.

**Matricaria suaveolens* Buch. Very plentiful by roadside, Town Ditch, near Hope, and also opposite the Schools, Higher Kinnerton, *Thomas*. Waste land behind the Palace Hotel, Rhyl, west end, in Lake Avenue, *Hodge*. Plentiful in lane south of Warren Dingle and about three quarters of a mile north-east of Hope Exchange Station, *Thomas*. Near Buckley Station, *Thomas*.

**Petasites fragrans* Presl. Entrance to Dyserth Church; a small patch to the left of the bridge over the stream.

Senecio sylvaticus L. var. **auriculatus* Smith. Hedgebank at the eastern end of the Rhyl Golf Course, *Hodge*.—*S. viscosus* L. In the quarry near the station at Caerwys, *Hodge*. Several plants amongst cinders on the south platform of Caerwys Station.—*S. erucifolius* L. Beyond the Grange Laundry near Rhyl, *Hodge*.

**Arctium nemorosum* Lej. Associated with *Smyrnium Olusatrum*, near the front of Nant Hall Hotel, Prestatyn, *Hodge*.

Carduus pycnocephalus L. Newmarket, *Day*. In disused quarry by roadside between Cwm and Rhuallt.—*C. nutans* L. The Gop, *Day*.—*C. crispus* L. Near Newmarket, *Day*.—Var. **acanthoides* L. In the quarry near Caerwys Station, *Hodge*; between the station and Caerwys, close to Cement Works, *New*.

Serratula tinctoria L. Near Llyn Helyg, *Day*; hedgebanks below Plass-yn-Cwm, extending for some distance towards Cwm, *Day*.

Leontodon hirtus L. Pastures by the side of the road and close to the cottages at the Rhyl end of the marsh road to Rhuddlan, after crossing the railway behind the Marine Park, Rhyl, *Hodge*.

Lactuca virosa L. A single plant growing on difficultly accessible limestone rocks near Dyserth.

Campanula latifolia L. Very fine and plentiful in the quarry, Afon wen, near Caerwys Station, *Hodge*.

Vaccinium Vitis-Idæa L. Pen-llun-y-gwr, just below the summit, *Thomas*.

Lysimachia vulgaris L. By the edge of a pit close to a small wood at the southern end of Rhydorddwy-wen Farm, near Rhyl, *Hodge*.

**Anagallis fœmina* Mill. In a meadow about half a mile east of Caerwys, *New*.

Ligustrum vulgare L. Steep limestone rocks in Nant-y-Ffrith, *Thomas*. Clearly native here.

**Polemonium cœruleum* L. Probably an escape, by the side of the stream at the ford, Cilcain, *Hodge.*

Cynoglossum officinale L. Near Carreg-y-ty, on the way to Cymmau, going up the lane past Llanfynydd Church, *Jones.* Between Newmarket and the Gop, *Day.*

Echium vulgare L. Railway embankment, Llannerch-y-mor, *Mason.*

Borago officinalis L. Near Prestatyn, *Hodge.*

Lithospermum officinale L. Between Caerwys and the Station, *New.*

Linaria viscida Moench. Plentiful on the railway embankment about fifty yards to the west of Caerwys Station, *Hodge.*

Veronica hybrida L. I am glad to find that this still occurs in the county, as I was afraid it had long been extinct. First observed by the Rev. W. Bingley in 1801, it does not appear to have been seen in Flintshire by any subsequent observer until this year. It was found by the Rev. J. Evans Jones, in some quantity, on carboniferous limestone, and I was pleased to discover it in a second Flint station last August.—*V. Anagallis-aquatica* L. var. **anagallidiformis* Bor. With the type in the marsh ditches between the Rhyl Golf Links and the railway, *Hodge.*

**Euphrasia gracilis* Fr. Rhyl Golf Course, *Hodge.*—*E. curta* Wettst. Craig Fawr.

Bartsia Odontites Huds. var. **serotina* Dum. Rhyl neighbourhood, *Hodge.* Between Cwm and Rhuddlan.

Verbena officinalis L. The Common, Caerwys, *New.*

Mentha Pulegium L. Between Cwm and Rhuddlan, *Herb. Day.*

**Calamintha parviflora* Lam. There are Flintshire examples of date 1842 in Miss Potts's herbarium at Chester.

Nepeta Cataria L. Near Rhyl, *Hodge.*

Galeopsis speciosa Mill. Near Rhyl, and also in the vicinity of Caerwys, *Hodge.*

Leonurus Cardiaca L. In one place on the coast road between Rhyl and Prestatyn, *Hodge.*

Lamium hybridum Vill. Roadside between Aston and Queen's Ferry, *Williams* (sp.). Roadside between Cymmau and Ffrith, *Thomas.* Two or three plants near Cwm, *Day.*—*L. album* L. Wall near Tryddyn, *Jones* (sp.).

Plantago lanceolata L. var. *sphærostachya* Roelh. The Gop, *Day.*

Polygonum Bistorta L. Entrance to Hafod Abley Wood near Llanfynydd, and also in a field on the south side of the wood, *Jones* (sp.).

Euphorbia exigua L. The Leet, *Williams.* In a corn-field about a quarter of a mile south of Rhyl Cemetery, on the farm called Rhydorddwy-wen, *Hodge.* Railway track at Dyserth Station, *Day.*

Humulus Lupulus L. By the stream south of Newmarket, *Day.* By a little pond near the footpath between Plassau and Pen-y-cefn-isaf, between Cwm and Newmarket, *Day.* Hedge close to Aston Hall Farm.

Taxus baccata L. In fair amount and clearly native on limestone rocks and elsewhere in Nant-y-Ffrith, *Thomas.* A farm not far away is known as Tan-yr-ywen (=Under the yew tree). The yew also finds mention in another Flint place-name in Moel Plas-Yw (=The bald hill of the hall of the yews), an elevation in the Clwydian range.

Helleborine latifolia Druce. In the wood at Caerwys, *Hodge.* —Var. *media* E. S. Marshall. In the woodland at the commencement of the Leet, near Coed-du, *Thomas.*

Orchis pyramidalis L. Near Caerwys, *New.*

Ophrys apifera Huds. In the neighbourhood of Dyserth, *Rev. J. Evans Jones.*

Habenaria bifolia R. Br. In a wood near Caerwys, *New.* Roadside near Cae-glas near Llanfynydd, *Jones* (sp.). The Leet, *Thomas* (sp.). By the road between Cwm and Llyn Helyg, *Day.* —*H. albida* Br. Near Pant Asaph, *New.*

Asparagus officinalis L. α *maritimus* Mill. Near the shore at Prestatyn, *Rev. W. W. Mason* (sp.). Between Gronant and Point of Aire, *Hodge.*

**Convallaria majalis* L. Seen wild in one place in May, 1910, by Miss Cummings and Mrs. New.

Juncus compressus Jacq. Prestatyn, growing amongst *J. Gerardi*, *Mason* (sp.).

Lemna trisulca L. Pond in field near Plas-yn-Cwm, *Day.*

Alisma ranunculoides L. Common in the ditches on the marsh land lying between the Rhyl Golf Links and the railway, *Hodge.*

**Potamogeton prælongus* Wulf. In the Clwyd in quantity, north-east of St. Asaph, *Day.*—*P. crispus* L. Ditches on the marsh between the Rhyl Golf Links and the railway, *Hodge.*

Zannichellia pedunculata Reichb. In a ditch by the side of the path leading across the marsh to Rhuddlan from Rhyl, by the side of the Clwyd, about a quarter of a mile from the railway crossing at the back of the Marine Park, Rhyl, *Hodge.* Marsh below Shotwick and Puddington.

**Eriophorum vaginatum* L. Gwern Mountain, *Thomas.*

Carex divisa Huds. The Cop, *Thomas* (sp.).—*C. vulpina* L. Lane between Newmarket Road and Marian Mills, *Day.* — *C. remota* L. Near Cwm, July, 1897, *Herb. Day.*—*C. sylvatica* Huds. In the lane leading from Caerwys, station past Afon wen, up to the village of Caerwys, *Hodge.*—*C. acutiformis* Ehrh. By the side of a ditch on the eastern side of Rhydorddwy-wen Farm near Rhyl, *Hodge.*—*C. axillaris* Good. In damp meadows near the "Sheepskin Factory," Caerwys, *New.*

Avena fatua L. var. **pilosissima* Gray. On the waste land on the north side of the Marine Park, Rhyl, *Hodge.*

Phragmites communis Trin. *β *nigricans* Gren. & Godr. Inland of Rhyl and in ditches near Prestatyn, *Hodge.*

Glyceria plicata Tr. In a damp place by the side of the lane (about half way up) leading from Caerwys Station to the village, *Hodge.* Morfa Rhuddlan.—*G. distans* Wahl. Prestatyn, *Mason.*

Bromus unioloides H. B. K. The Cop, *Thomas* (sp.).

Hordeum murinum L. Along the Ochr-y-Foel Road, Dyserth, just above the station.

A NEW SECTION OF *LONCHOCARPUS.*

By S. T. Dunn, B A., F.L.S.

Among the type examples of *Millettia Thonningii* (Baker in Oliver, Fl. Trop. Afr. ii. 128) we find specimens of two African trees with few-paired pinnate leaves and racemes of handsome flowers, one, however, having its racemes ebracteate, pedunculate, short and loose, while in the second they are long, compact, and floriferous to their densely bracteate base. The names under which they were originally described, viz. (1) *Robinia Thonningii* Schum. & Thonn., and (2) *Millettia Griffoniana* Baill., are included among the synonyms (*loc. cit.*).

Baillon's tree is easily recognizable by its long crowded tail-like racemes, and is represented by a remarkably complete series of specimens collected all down the coast of tropical West Africa, from Sierra Leone to Angola, and there is no doubt that it is not only specifically but generically distinct from the other. Even over this large area, indeed, it maintains so close a uniformity of characters that it cannot conveniently be divided into varieties, though it shows a tendency in the southern portion of its range to produce flowers with slenderer pedicels and smaller bracts upon a thinner rachis. To this form belongs the Kamerun tree, which Dr. Harms has described as *Derris leptorhachis.* There is no doubt whatever that this and Baillon's tree belong to the same species, and that with it must be associated a second species discovered by Kitson in S. Nigeria, but to what genus they should be referred was an open question until fruit was found; Harms was as well justified in referring his tree to *Derris* as Baillon his to *Millettia.* Fruit has, however, now been collected in the Kamerun forests, and, being indehiscent and wingless, necessitates the removal of these species from *Derris* and *Millettia* to *Lonchocarpus*, with which their turbinate calyx also agrees. They differ, however, so markedly from any species of that genus known to me that it appears convenient to keep them together under the sectional name of *Caudaria*, a designation suggested by the tail-like appearance of their racemes.

Lonchocarpus § Caudaria sect. nov.

Flores in rachidibus longis pendulis sessilibus nodoso-racemosi.

1. L. Griffonianus Dunn, nom. nov. *Millettia Griffoniana* Baill. Adans. vi. (1866) 222; *M. Thonningii* Baker in Oliver, Fl. Trop. Afr. ii. (1871) 128; *Derris leptorhachis* Harms in Engl. Jahrb. xxvi. (1899) 302.

West Trop. Africa. Sierra Leone, *Barter*, n. 1623, 3265; Gold Coast, *W. H. Johnson*, n. 456; Lagos, *Moloney*, n. 21, *Millen*, n. 129; Nigeria, Old Calabar, *Mann*, n. 2282, *Chevalier*, n. 5042; Kamerun, *Preuss*, n. 1155; Batanga, *Bates*, n. 318; Gaboon, *Soyaux*, n. 101, *Bates*, n. 487; Congo, *Hens*, n. 335, *Christian Smith*; Angola, *Welwitsch*, n. 1860–2.

2. **L. multifolius** Dunn, sp. n. Arbor magna, ramis exigue tomentosis. Folia 12–15 cm. longa, 7-juga, stipellata; foliola oblonga, acuminata, basi obliqua, rotundata, 4–5 cm. longa, chartacea, supra glabra opaca, subtus præcipue in costa tomentosa. Racemi axillares ad 25 cm. longi, fere ad basin floriferi; flores 8–10 mm. longi, nodoso-racemosi, nodis ad 5 mm. longis, pedicellis 2–3 mm. longis, ut rachidibus tenuiter tomentosis, apice bracteolis 2 subulatis; calyx campanulatus, 3–4 mm. longus subglaber, dentibus 4, tubi quartam partem æquantibus, ovatis; petala glabra; vexillum sine ungui rotundatum, basi breviter cordatum; stamen vexillare medio connatum; ovarium tenuiter sericeum multi-ovulatum.

West Trop. Africa. S. Nigeria, *Kitson*, March 21, 1909 (Brit. Mus. Herb.).

This species is easily distinguished from *L. Griffonianus* by its more numerous leaflets.

SPIRÆA ULMARIA L. var. *DENUDATA* Boenn.

By A. R. Horwood.

Mr. Druce does me an honour in singling out my six-year-old note on this plant.* *I* also "hold no brief for (or against) *denudata*," but when one finds that *one and the same plant* is made up of typical *Spiræa Ulmaria*, the so-called variety *denudata*, and a leaf of an intermediate type, it is reasonable to say that *denudata* has no title to rank as a variety, and to assume that it is merely a state, unstable in the same specimen, and of no more value than lupus in man, and like that due to pathological causes. Of what real value, to take a similar case, is the variety *Pryorii* of *Papaver Rhœas*? In the herbarium the red colour of the hairs of the peduncle, its chief distinction, is lost. Varieties based on whether some portion of the plant is hairy or glabrous throughout are far from satisfactory, e. g. *Sisymbrium officinale* var. *leiocarpum*, *Acer campestre* var. *leiocarpon*, and the like. In the nomenclature of Lichens far more names rank as "subspecies" and "forms" than as varieties, and this seems much more sensible than adhering to the higher rank, in the last case, of variety.

For evolution exhibits three modes of progress. We have *heredity*, which tends to preserve species in their original form, and to perpetuate the type. The active agent of evolution is *variation*, which tends to multiply its stock by the production of variations. These last, as subdivisions of a former species, heredity tries to maintain without further alteration, whilst the antagonistic factor of variation tends to multiply them afresh. Then Mendel's Law gives us a tendency in some to go back to their original form, while a simultaneous effort is made to produce the same or fresh forms. In this Scylla and Charybdis of conservation and progress a state of instability may be created; some forms are evolved or produced which, by their purely physiological origin, are evolved alone by physiological stimulus, and are not perpetuated, or their origin may be pathological. Whilst a variety may be defined as a variation of some important morphological or structural significance, which persists alongside of a type from which it was manifestly derived, the status of a "form," "state," &c., must be regarded as inferior to those differences in individual species which are called varieties. This is because permanent variations are useful adaptations, whilst forms or states are merely ephemeral reactions to stimuli called forth by a disorganized state, an abnormal environment, or the effect of adjacent species. The ultimate test of species, variety, or form is found only by cultivation for several generations, and this in the present instance does not appear to have been done.

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* See Journ. Bot. 1910, 281.

The greater plasticity of plants (compared with animals) renders them more liable to become abnormal, and open to the attack of other plants. This is well illustrated in the case of microscopic fungi, *e.g.* rusts, smuts, where the condition they induce is closely analogous to the white coloration of the under surface of *Spiræa Ulmaria*. It may be due perhaps to the plant's inability to manufacture its food-substances, and to answer fully to the stimulus of chlorophyllization, which is stimulated externally and produces an inner derangement.

To sum up, species are the biological units once differentiated by variation, which goes on complicating original differences, so that permanent varieties occur, and at the same time plants are open to detrimental effects of environment and resulting reaction, often impermanent, as here. These must not be confused with permanent intermediate forms obtained by hybridization and crossing, which remain constant, and are produced by definite interbreeding.

When species, variety (so-called), and an intermediate state are commingled in the same unit, it is reasonable to suggest that the two last are of no permanence, and in this case that the *denudata* form of *Spiræa Ulmaria* is a malformation.

MARINE ALGÆ FROM THE KERMADECS.

By A. & E. S. Gepp.

The following is a list of marine algæ collected by Mr. Reginald B. Oliver, of H.M. Customs, Christchurch, New Zealand, during his visit to the Kermadec Islands in 1908. An account of the vegetation of the islands is published by him in Trans. New Zealand Institute, vol. xlii. 1909, pp. 118–175, in which he gives a history of the past botanical investigation of the Kermadecs, a description of their Geology, Climate, Introduced Animals and Plants, Plant Formations, Geographical Distribution, &c. The following facts are largely derived from his paper.

The Kermadec Islands are four—Sunday Island or Raoul

Island, Macauley Island, Curtis Island, and French Rock—and are situated half-way along the submarine ridge which connects New Zealand with the Tonga group. They are volcanic and composed of tufas. Sunday Island is the largest of the group, and its coast is rocky save for the gravelly beach in Denham Bay on the south-west side, and some sand on the north shore. These islands lie far away from any land from which they could have derived their flora and fauna; and hence their great interest to students of geographical distribution. The preponderance of the flora is of the New Zealand type, bringing the islands into the New Zealand biological region. Dr. Cockayne has made the Kermadecs a separate province of that region; but Mr. Oliver endeavours to show that they unite with Lord Howe Island and Norfolk Island to form a natural division, for which he proposes the name "subtropical islands province."

The marine algæ collected by Mr. Oliver were sent to Mr. R. M. Laing, who very kindly invited us to identify them. He intends to publish a list of them himself in New Zealand, but suggests that in the meantime we should give the names in this country.

As regards the geographical distribution of the species, it will be seen that none of them is endemic unless it be the *Galaxaura*, but that the majority are found in New Zealand. Mr. Oliver (*loc. cit.* p. 156), writing on "Dispersal," says: "The nature of the material cast up on the shores of Sunday Island points to the south or south-west as the direction from which the strongest and most frequent [ocean currents] reach the group. Several kauri (*Agathis australis* Salisb.) logs, some bearing brands of New Zealand firms, are lying on the shores of Sunday Island, and on the north coast is a balk of Oregon pine, supposed to have formed part of the cargo of the 'Elingamite,' wrecked on the Three Kings Islands in 1903. Again, during the months of July to October, 1908, when strong westerly winds prevailed, a large amount of seaweed was cast up in Denham Bay. . . . It is evident that a strong ocean current flows from New Zealand in a north-easterly direction; and this in my opinion is sufficient to account for the preponderance of New Zealand forms in the flora of the Kermadec Islands."

A study of the charted ocean currents of the South Pacific confirms this view, and shows at once that the Kermadecs are in a very interesting position. A branch of the great South Equatorial Current sweeps down to the south-west past Samoa, Fiji, and the Friendly Islands. It runs on past Norfolk Island and Lord Howe Island, and skirts down the coast of the Continent of Australia (East Australian Current). Then colliding with the cold subantarctic water of the strong West Wind Drift, it is deflected, and now runs up north-east past the islands of New Zealand, and strikes across to the Kermadecs. Here it joins another branch of the South Equatorial Current, which has swept down south from the Friendly Islands. The conjoined currents pass away to the south-east. Thus the Kermadec group is washed by oceanic currents from the north and from the south-west, the latter being the stronger of the two. The result of this upon the algæ is shown by the fact that the majority of the species received belong to the New Zealand flora, and at least one (*Peyssonnellia*) to the flora of the Friendly Islands.

The Kermadecs were visited by H.M.S. 'Herald' in 1854 under Captain H. M. Denham, whose name is perpetuated in the chart of Sunday Island. On board were the naturalists Milne and MacGillivray, who made a small collection of plants, which were described by Sir Joseph Hooker (Journ. Linn. Soc. Bot. i. p. 125 (1857)). The few algæ included in the collection are in Kew Herbarium, but apparently were never published. No other algæ appear to have been gathered on the shores of the Kermadecs until Mr. Oliver made his long stay on Sunday Island in 1908. However, Dickie, in his report on the algæ of the 'Challenger' Expedition, records *Cystophora elongata* as found floating in the deep sea off Raoul (or Sunday) Island. We make further reference to this under *Carpophyllum elongatum*. Mr. Cotton, of Kew Herbarium, has also received lately some marine algæ from the Kermadecs; and it is with profit that we have compared the two sets and exchanged views with him.

Ulva Lactuca Linn., nos. 1334, 1340. "On rocks between tidal marks, Meyer Island."

Geogr. Distr. General.

Ulva lætevirens Aresch., no. 1341. Cast up on Denham Bay Beach.

Geogr. Distr. South Australia. Tasmania.

Enteromorpha compressa Grev., nos. 1332, 1333. "On rocks between tidal marks, Meyer Island."

Geogr. Distr. N. and S. Atlantic. N. and S. Pacific.

Cladophora fusca Martens, nos. 1318, 1348. "In rock pools, Meyer Island."

We have little hesitation in referring our plants to *C. fusca*, though we have had no opportunity of seeing an authoritative example of it. Martens' description is a little puzzling in respect of the branches, which are stated to be twice as thick above as at base—a character which does not appear in the figure. Our plants agree with Martens' figures, but attain larger dimensions, our biggest specimen being three inches high. In Kew Herbarium are other specimens from the Kermadec Islands, which were collected during the visit of H.M.S. 'Herald' in 1854. They bear the name *Cladophora prolifera*, but whether they were ever published we do not know. The range of the species extends to Ceylon, where it was collected by Ferguson. His specimens (no. 86) are represented in the British Museum Herbarium. The type-specimens were collected at Mampawa, on the west coast of Borneo, and at Palabuan.

Geogr. Distr. Borneo.

Vaucheria sp., no. 1308. Growing epiphytically. Meyer Island.

Caulerpa racemosa var. *uvifera* Weber v. Bosse, forma *intermedia* W. v. B. Meyer Island.
Geogr. Distr. Indian and Pacific Oceans. West Indies.

Codium tomentosum Stackhouse, no. 1313. Meyer Island.
Geogr. Distr. General.

Durvillæa sp. Cast up on Denham Bay Beach. (Not sent.)

Hormosira Banksii Decaisne, no. 1344. Cast up on Denham Bay Beach, Sunday Island. (Not sent.)
Geogr. Distr. Australia. New Zealand. Tasmania.

Carpophyllum maschalocarpum Grev., no. 1349. "Probably not growing locally; in drift-weed only." (Not sent to us.)
Geogr. Distr. New Zealand.

CARPOPHYLLUM ELONGATUM (comb. nov.).
Syn. *Cystophora elongata* Dickie in Journ. Linn. Soc. xv. (1876), p. 241.
Carpophyllum angustifolium J. G. Agardh, Lund Univ. Acta, xiv. Math. No. iv. p. 8 (1877).

Though this species was not gathered by Mr. Oliver, it was found by the 'Challenger' Expedition "floating freely on the surface in small bunches, inhabited by oceanic animals, thirty miles distant from Raoul Island, Kermadecks, July 14, 1874. Vesicles large, inch to 1½ inch long, elliptical subacute, and with copious efflorescence of mannite" [Dickie MS. in herb.]. It is represented in both the British Museum and Kew Herbarium, and it appears to be identical with the *Carpophyllum angustifolium* collected by S. Berggren in New Zealand and described by J. G. Agardh. We have not seen Agardh's type, but we find Dickie's specimens to be exactly like that figured by Mr. R. M. Laing in Trans. Proc. New Zealand Institute, xxxii. p. 67, pl. v. fig. 1 (1899), which was found by him in the Bay of Islands, "apparently from the same tidal pools from which Berggren obtained it." Mr. Laing redescribes the species (*loc. cit.*), and what he says of his plant applies to the 'Challenger' specimens. These latter may be presumed to have drifted across to the Kermadec group from the north end of New Zealand.
Geogr. Distr. New Zealand.

Carpophyllum Phyllanthus Hook. et Harv., no. 1350. Drift, Denham Bay Beach, Sunday Island.
Geogr. Distr. New Zealand.

Carpophyllum plumosum J. Ag., no. 1359. Cast up on Denham Bay Beach, Sunday Island. Mr. Oliver says: "This species, as well as *C. maschalocarpum*, *Durvillæa* sp., and *Hormosira Banksii*, do not, I think, live in Sunday Island waters, but are brought by ocean currents. They are found washed up on the beaches, and usually have barnacles attached to them."
Geogr. Distr. New Zealand.

Taonia australasica J. Ag., no. 1317. Meyer Island.
Syn. *Spatoglossum cuneatum* J. Ag. ex J. B. Wilson in Proc. Roy. Soc. Victoria, iv. p. 162 (1892).

Mr. J. Bracebridge Wilson collected this species on Jan. 23, 1886, at Port Phillip Heads, as the specimen in the British Museum shows. In his catalogue of algæ collected at or near Port Phillip Heads and Western Port, he gave it J. G. Agardh's MS. name, *Spatoglossum cuneatum*. Agardh described the plant in his *Analecta Algologica Cont.* i. p. 30 (1903), under the other name. Mr. J. B. Wilson's rich herbarium of Victorian algæ is in the British Museum; and it may be added that an interesting biographical notice of him and a portrait were published by Dr. J. H. Maiden in the *Victorian Naturalist*, xxv. pp. 116, 117 (1908).

Geogr. Distr. Victoria.

Gymnosorus nigrescens J. Ag., nos. 1362, 1365, 1374. Cast up on Denham Bay Beach.

Geogr. Distr. North, South, and West Australia.

Dictyota prolificans A. & E. S. Gepp, nos. 1314, 1323. Meyer Island.

Geogr. Distr. New South Wales and Queensland.

Sargassum fissifolium J. Ag., no. 1367, on rocks near low-water mark, Meyer Island; no. 1368, on rocks between tides, Fleetwood Bluff, Sunday Island; no. 1369, cast up on Denham Bay Beach, Sunday Island. Mr. Oliver says: "This is the most abundant seaweed found growing on the rocks of Sunday and Meyer Islands. It does not grow above the level of low-water mark, except on rocks in exposed places, where they are continually washed by the waves, and in rock-pools near the south side of a cliff. Its distribution is thus determined directly by the amount of heat received from the sun."

Geogr. Distr. Queensland.

Chantransia sp., no. 1361. Without fruit. Epiphytic on *Gymnosorus nigrescens*, Denham Bay Beach.

Galaxaura sp., no. 1351*a*. Rocks near low-water mark, Meyer Island. The same species was collected during the visit of H.M.S. 'Herald' in 1854, and is placed under *G. lapidescens* in Kew Herbarium. To what modern species these plants should be referred we do not attempt to decide until we can make an adequate study of the entire genus. The large number of new species created by Kjellman in his monograph of *Galaxaura* have vastly increased the difficulty of identifying specimens.

Zanardinia marginata J. Ag. (= *Brachycladia marginata* Schm.), no. 1355. Sunday Island.

Geogr. Distr. North and South Atlantic. North and South Pacific. Indian Ocean.

Gelidium longipes J. Ag. "Densely tufted. On rocks between tidal marks, Nov. 1908." This specimen agrees in habit and structure with a specimen from New Zealand in the British Museum Herbarium collected by Berggren, and named by J. G. Agardh *Gelidium longipes*. The Kermadec plants differ only in being shorter and in not being so freely branched, nor somewhat compressed at the apices, as in Berggren's plant. However, the

Kermadec specimens appear to be young and still growing. We find in one a tetrasporic branch, but as a rule the thallus has the appearance of being not yet mature.

Geogr. Distr. New Zealand.

Pterocladia capillacea Born., nos. 1310, 1352. Growing epiphytically, Meyer Island. "Called turtle moss by the inhabitants, because eaten by the turtles." Sunday Island.

Geogr. Distr. Atlantic, Mediterranean, Cape of Good Hope, Indian Ocean, China, Japan, Australasia.

Gracilaria confervoides J. Ag., no. 1358 (pro parte). Cast up on Denham Bay Beach, Sunday Island.

Geogr. Distr. Atlantic, Pacific, and Indian Oceans.

Laurencia Forsteri J. Ag.? no. 1358 (pro parte). Cast up on Denham Bay Beach, Sunday Island.

Geogr. Distr. South and West Australia.

Plocamium brachiocarpum Kütz., nos. 1335, 1336, 1337, 1339. "Cast up on Denham Bay Beach, Sunday Island, Oct. 1908."

Geogr. Distr. New Zealand.

Martensia elegans Her., no. 1327. On rocks near low-water mark, Coral Bay, Sunday Island.

Geogr. Distr. South Africa. West Australia. New South Wales.

Nitophyllum decumbens J. Ag., no. 1363. On *Carpophyllum plumosum*, cast up on Denham Bay Beach.

Geogr. Distr. New Zealand.

Delisea pulchra Mont., nos. 1338, 1353. Cast up on Denham Bay Beach, Sunday Island. "Intestines of a turtle, twenty yards in length, full of this plant in all stages of digestion. A little of the same species was found growing on the outside of the neck of the turtle."

Geogr. Distr. Eastern Australia. Tasmania. New Zealand.

Asparagopsis Sanfordiana Harv., no. 1330. Meyer Island. The specimens are very rotten, but appear to be altogether referable to this species. Hitherto it has only been recorded from Western Australia, but in Kew Herbarium is a specimen from Keppel Bay, Queensland.

Geogr. Distr. Western Australia and Queensland.

Euzoniella incisa Falk. (=*Polyzonia incisa* J. Ag.), nos. 1311, 1319. Meyer Island.

Geogr. Distr. South-west Australia. Tasmania. New Zealand.

Spongoclonium Brownianum De Toni (*Callithamnion Brownianum* Harv.), no. 1326. On rocks near low water, Boat Cove, Sunday Island.

Geogr. Distr. West Australia.

Peyssonnellia rubra J. Ag., no. 1354. Rock-pools, Sunday Island. This is the same as no. 39 of Harvey's *Friendly Islands Algæ*.

Geogr. Distr. Adriatic. Polynesia.

Melobesia sp., no. 1322. Meyer Island.

Amphiroa anceps Decne., no. 1346. On rocks below low-water mark, Meyer Island, May 19, 1908.
Geogr. Distr. Norfolk Island.

Cheilosporum elegans Aresch., no. 1347. On rocks below low-water mark, Meyer Island.
Geogr. Distr. New Zealand. New South Wales.

Corallina officinalis L., nos. 1320, 1357. Rock-pools, Meyer Island; also Sunday Island. "Forms a dense coating up to an inch high on rocks from low tide to about half-tide mark, and in rock-pools."
Geogr. Distr. General.

Corallina sp., no. 1329. Sunday Island.

Corallina Cuvieri Lamx., nos. 1342, 1343. Cast up on Denham Bay Beach, Sunday Island.
Geogr. Distr. South Australia. Tasmania.

PLANTS OF THE AZORES.

By G. Claridge Druce, M.A., F.L.S.

In the early March of 1909 I made a short stay in San Miguel, the chief island of the Azores, which I reached after a tempestuous passage from Madeira. The islands are about 700 miles from Portugal, 1150 from Britain, and 1700 from Newfoundland. The country is well cultivated, maize being the chief corn crop, but potatoes, sweet-potatoes, and other vegetables are grown, and there is a considerable extent of pasturage on which many cows are reared. Sheep, too, are raised not only for their flesh and wool, but are also used as draught animals. The people are honest, industrious, and kindly. The climate, although somewhat damp and relaxing, is very equable, frost being unknown at the sea-level. The rainfall is only about twenty-nine inches, but there are boisterous winds, which sweep the place with great violence. Tropical, or perhaps more correctly subtropical, vegetation flourishes, and some of the Quintas abound with a most varied collection of trees and flowering shrubs brought from almost all parts of the world. Many adventitious plants abound, and indeed give a key-note to the flora. Pineapple culture has now almost replaced the growth of the St. Michael oranges. The scenery is somewhat marred by the high lava-walls, built to shelter the gardens, and they stretch so far from the town of Ponta Delgada that it is difficult to obtain a view, or to get free from them into open country.

The Azores are practically volcanic cones, San Miguel being entirely volcanic, so that calcareous species are absent. In the Crater of Fundas, with its extremely interesting geysers, there is very beautiful scenery, the high walls of the crater being covered with vegetation, including not only native species, but the planted Japanese *Cryptomeria* and the Australian wattle, besides the naturalized Indian *Hedychium*. From a lake a small stream of clear water, bordered by white Japanese azaleas, flows by the hot springs, where its muddy meadows are full of the tara (*Colocasia antiquorum*); the hedgerows leading to the Fundas and in other parts of the island being formed of *Hydrangea*, with its magnificent show of pink or bluish blossoms.

The Sete Cidades is also a strikingly romantic place, and the summit of the hill commands an unusually interesting and charming view, not only of the beautiful coast-line and the great crater with its sapphire and its emerald lake, but of the perfectly formed subsidiary crater, now a wealth of vegetation.

The botany of the island has been well explored by Dr. Carreiro, to whose kindness I am much indebted, both during my visit and subsequently for sending to me a hundred of the typical island species. The Azores are interesting to British botanists also from the fact that H. C. Watson visited them and prepared a valuable and interesting list of the plants which was published in F. du Cane Godman's *Natural History of the Azores*, in 1870. The most recent work on the island flora is that by Prof. Trelease, which appeared in the *Eighth Annual Report of the Missouri Botanical Garden* (1897).

To the fact of my visit being made so early in the year is probably due the discovery of five new species of mosses, one being new to science. It was pleasant to meet with the very local endemic species *Campanula Vidalii* on the main island of San Miguel, as well as to add two or three other species to the flora.

I am indebted to Prof. Hackel, Mr. H. N. Dixon, and to Mr. S. Macvicar for naming the grasses, mosses, and hepatics respectively.

Papaver Rhœas L. var. *Pryorii* Druce. Ponta Delgada; possibly introduced. I saw it also at Funchal, in Madeira.

Cardamine caldeiranum Guth. var. *amplifolium* Trelease. This interesting endemic plant, which, although a distinct species, is somewhat intermediate between *C. amara* and *C. sylvatica*, was seen at the Fundas. Watson found that it maintained itself "self-sown and quasi-spontaneously" in his Surrey garden.

Sisymbrium officinale Scop. var. *leiocarpon* (Jord.). This is, as Trelease observes, the prevailing form; noticed also in Madeira.

Cerastium viscosum L. The common form has flowers with distinctly larger petals than our British plant.

Spergula arvensis L. The form with papillose seed alone noticed, i. e. *S. vulgaris* Boenn.

Hypericum humifusum L. Near Lomba da Cruz.—*H. foliosum* Aiton. On the ascent to Sete Cidades. Lowe (Fl. Mad.) says this is distinct from the Madeiran *grandiflorum*, therefore it is probably endemic.

Oxalis purpurea Jacq. Well naturalized at Ponta Delgada, &c.

Vicia atropurpurea Desf. A form of this handsome species was seen westward of Ponta Delgada.

Trifolium angustifolium L. In two or three places on lava-walls about Ponta Delgada. Not given for San Miguel by Trelease.

Lupinus tenuis Forsk. North of Ponta Delgada, doubtless as a relic of fodder culture. Not given by Trelease.

Ornithopus compressus Druce. In the roadway in the Furnas.

Rubus rusticanus Merc. Appears to be the prevailing bramble throughout the island.

Fragaria indica L. Naturalized north of Ponta Delgada; I also saw it by the roadside near Turin, in Italy.—*F. vesca* L. Just the British plant at Ribiera Grande.

Potentilla erecta Hampe var. *insignis* (Domin, *in lit.*). *P. Tormentilla* var. *insignis* Domin in Fedde, Nov. Sp. v. 66, 1908:—"Caules robusti elato-erecti, superne tantum pauci-ramosi 25–35 cm. alti, dense adpresso-pilosi; folia magna foliolis sessilibus coriaceis (intermedia 2–3 cm. longo) obovato-cuneatis, utrinque 4–6-dentibus lanceolatis acutis instructis, adultis quoque supra et subtus ad nervos valde prominulos longe adpresso-pilosis; stipulæ oblique obovato-rotundatæ 2 cm. et ultra longæ et interdum latiores, inciso serratæ, flores ca. 15 mm. late tetrameri; calycis adpresso-pilosi, sepala externa internis paulo breviora; petala diametro transversiali latiora."—K. Domin, *in lit.* San Miguel, F. D. Godman in Herb. Kew. 1865. Wolf, *Mon. Gatt. Potentilla*, p. 647, 1908. I saw this interesting plant in several places in the crater of the Fundas; it has a robust bushy growth, quite erect, and has four to five petals. I should think it is a distinct species, bearing the same relation to our own *P. erecta* and *procumbens* as the Azorean *Cardamine* does to our *C. amara* and *sylvatica*; it might appropriately bear the name *P. insignis* (Domin) suggested by that botanist.

Tillæa muscosa L. Trelease observes that it had not been recently collected, and that excellent local botanist my friend Dr. Carreiro also told me he had not seen it. I found it on damp roadsides in the Fundas, on the lava-ridges by the track to the Sete Cidades, and in the Quinta of Dom Jose do Canto at Ponta Delgada.

Lythrum Hyssopifolia L. Fundas.

Fuchsia macrostemma Ruiz & Pavon. Naturalized on walls in several places, as Trelease observes.—*F. Ricartoni* Hort. is naturalized to the west of Ponta Delgada.

Hedera canariensis Willd. var. *azorica*. Between Ribiera Grande and Fundas, and on the ascent to Sete Cidades.

Sherardia arvensis L. var. *maritima* Griseb. Ponta Delgada; the type only is mentioned by Trelease.

Viburnum Tinus L. var. *subcordatum* Trelease. In some quantity near Lomba da Cruz. Watson recognized the difference of the leaf-characters from those of *V. Tinus*.

Leycesteria formosa Wall. Completely naturalized in the Fundas.

Rubia angustifolia L. Sete Cidades, &c.; quite distinct, I think, from our *R. peregrina*, an opinion stated also by H. C. Watson.

Kentranthus Sibthorpii Heldr. & Sart. Not mentioned by Watson. A narrow-leaved plant, identified as above by Trelease, naturalized at Ponta Delgada, &c.

Erigeron canadense L. This ubiquitous alien species has found its way into San Miguel.—*E. mucronatus* DC. is also naturalized in many places, as at the Furnas. — *E. linifolius* Willd. Ponta Delgada.

Gnaphalium luteoalbum L. and *G. purpureum* L. Ponta Delgada.

Bidens pilosa L. Naturalized at Ponta Delgada, and likely, as in Madeira, to become a pest.

Petasites fragrans Presl. Near Ponta Delgada.

Senecio malvæfolius DC. Rare; on cliffs at Capellás. — *S. mikanioides* Otto. This African species I saw on the site of an old garden west of Ponta Delgada. It is quite naturalized in Madeira.

Urospermum picroides Schmidt. On waste ground at Ponta Delgada; Trelease says "not recently collected."

Campanula Vidalii Watson. This very interesting and local species was discovered by Captain Vidal, who picked it on an insulated rock off the coast of Flores. Watson was unable to find it on the mainland. Hunt, according to Watson, was afterwards more successful in finding it locally on the coasts of Santa Maria and San Miguel, whence its introduction to English gardens is said to be due. Trelease, however, states that it "occurs on cliffs and detritus by the sea-shore and on outlying rocks round the entire island of Flores," and goes on to say that, as regards Santa Maria and San Miguel, "the impression there and in Terceira is that it occurs in cultivation only, and was originally derived from Flores." It is therefore pleasing to be able to add a station where it is indubitably native on San Miguel. This is at Capellas, a fishing-town of about three thousand people, nearly nine miles from Ponta Delgada. In the narrow bay is a considerable whale fishery, which gives the town its prosperity. The bay is surrounded on three sides by very steep cliffs, especially on the southern side. In one a path has been cut in the solid lava, by which access is given from the top to the sea-level. A wall protecting from the sea is thus formed; on this I climbed to see what vegetation grew on the seaward side, where the cliff is vertical. A plant, which I took to be a *Euphorbia*, grew temptingly out of reach, but I managed to reach a few of the leaves and a flower-stalk of the preceding year, and then recognized this extremely local species. Dr. Carreiro has since seen the plant there, and I believe supports my view of its being indigenous in a station where it is not likely to be eradicated. The plant is full of an extremely viscid milky juice, which can be drawn out in long threads. It grows well from seed in England.

Vaccinium cylindraceum Sm. Lameiro, &c. An endemic species.

Erica azorica Hochst. With other brushwood this species is being rapidly destroyed, owing to the culture of pineapples. The brushwood is cut into small pieces and spread about nine inches thick in the glass-houses, then covered with some soil: into this compost the pots of pineapples are placed, and the plants ripen without other artificial heat than that induced by the fermentation of this vegetable substance.

Lysimachia azorica Hornem. Very closely allied to our own *L. nemorum*, with which indeed it is merged in *Index Kewensis*. Watson considered it distinct; an analogous case to that of *Potentilla insignis*. I saw it sparingly in the Sete Cidades.

Myrsine africana L. var. *retusa* DC. Near the Fundas, Lagoa, &c.; an interesting species with copious berries covered with bloom, looking temptingly eatable, but when eaten producing unpleasant effects.

Vinca difformis Pour. This beautiful species was a great adornment to the delightful woods of the Fundas.

Centaurium pulchellum Druce. In the Fundas, but not quite typical, being laxer, and with slightly larger and paler flowers; perhaps worth separating as var. *azoricum*. New to the Azores.

Tecoma radicans Juss. This North American species is naturalized to the west of Ponta Delgada.

Linaria Cymbalaria Mill. Ponta Delgada; Fundas.

Antirrhinum Orontium L. Frequent, but, as in Madeira, with paler flowers than our British plant.

Veronica peregrina L. This North American species is naturalized in garden ground at Ponta Delgada and by the roadway in the Fundas.—*V. officinalis* L. Ponta Delgada.

Linaria Cymbalaria Mill. San Miguel, new to that isle.

Mentha Pulegium L. Near Povoacao.

Marrubium vulgare L. Near Ponta Delgada.

Ballota nigra L. "Not recently collected," Trelease. I saw it in Ponta Delgada.

Plantago lanceolata L. var. *eriophylla* B.-Webb & Berth. Ponta Delgada; Lomba da Cruz.

Alternanthera Achyranthes Br. Ponta Delgada; Villa Franco da Campo.

Polygonum hydropiperoides Michx. Fundas.

Chenopodium murale L. Ponta Delgada.

Euphorbia azorica Hochst. Ponta Delgada.

Buxus sempervirens L. A narrow-leaved plant in the Fundas; probably planted.

Salix cinerea L. Probably planted, but not given in Trelease's list.

Persea azorica Seubert. Sete Cidades.

Mercurialis ambigua L. f. Ponta Delgada.

Ficus repens Rottl. This Indian species was naturalized in the Fundas, by the stream-side near the park of Viscount Porto Formoso.

Hedychium Gardnerianum Rosc. This Indian species is completely naturalized in the Fundas, forming in many places the chief undergrowth in the woods.

Iris fœtidissima L. Near Villa Franca.

Amaryllis Belladonna L. Naturalized in a few places.

Canna indica L. Naturalized west of Ponta Delgada.

Arum italicum Mill. Fundas; Ponta Delgada.

Richardia africana Kunth. Now abundantly and completely naturalized by stream-sides in several places.

Colocasia antiquorum Schott. Naturalized in the Fundas, where it is extensively cultivated in moist ground by the streams near the geysers. From the tuberous roots, "Tara," a mucilaginous fecula, is obtained, and largely used as an article of diet.

Carex macrostyla Lapeyr. var. *peregrina* L. H. Bailey. Furnas. —*C. Pairæi* F. Schultz. Dr. Carreiro had kindly sent this from St. George Island under the name *C. muricata*. New to the Azores.

Festuca Myurus L. New to San Miguel. I saw it on some wall-tops in Ponta Delgada; it is not quite typical, and, as Professor Hackel says, shows an approach to *F. Broteri*.

Dicksonia Culcita L'Hér. Furnas; common and very beautiful.

Adiantum Capillus-veneris L. About the hot springs of the Furnas.

Asplenium Hemionitis L. Sete Cidades. — *A. monanthum* L. Furnas.—*A. lanceolatum* Huds. Ponta Delgada, &c.—*A. marinum* L. Capellas.

Woodwardia radicans Sm. Fundas; abundant.

Blechnum Spicant Roth. Fundas.

Dryopteris aristata Druce. Very luxuriant in the Fundas; Sete Cidades.—*D. paleacea* Druce. Sete Cidades.—*D. mollis* (Sw.). Sete Cidades.

Gymnogramme Tetta Schl. Sete Cidades.

Hymenophyllum unilaterale Bory. Fundas. — *H. tunbrigense* Sm. Sete Cidades.

Osmunda regalis L. Fundas.

Selaginella Kraussiana Br. Fundas; Sete Cidades; north of Ponta Delgada.

Lycopodium cernuum L. Fundas; a most beautiful species. Sometimes growing on concretionary rock deposited by the hot springs.—*L. Selago* L. var. *suberectum* Baker. Fundas.

Equisetum ramosissimum Desf. In the Fundas.

I gathered at Fundas *Targiona hypophylla* L. and *Cousinia marchantioides* Raddi, which appear to be additions to the Azores. The few mosses I collected included one new to science, *Bryum clavatulum* Cardot & Dixon, besides five additional to the Azores, i. e. *Timmiella Barbula* Limpr., *Barbula gracilis* var. *viridis* B. & S., *Tortula muralis* Hedw., *Barbula vinealis* Brid., and *Bryum murale* Wils.; these, with other species gathered by me, have already been recorded by Mr. H. N. Dixon in Journ. Bot. 1909, 372.

THE GENUS *DIASTELLA*.

By E. P. Phillips, M.A.

The genus *Diastella* was founded in 1809 in Knight's *Proteeæ*, p. 61, and defined as follows:—"Diastella *Salisb.* Flores in Capitulo plus minus truncato terminali. Bractea 1 inter singulos, præter Involucrum gemmacearum, membranaceæ. Petala vix irregularia, post anthesin apice erecta, basi tantum cohærentia. Pericarpium ut in *Leucadendro*. Stylus barbatus, tandem deciduus. Frutices, sæpius procumbentes. Folia simplicia, in pluribus viridia, rarissime ad apicem 3-dentata." Seven species were described, viz. *D. bryiflora*, *D. serpyllifolia*, *D. vacciniifolia*, *D. parilis*, *D. myrtifolia*, *D. ericæfolia*, *D. humifusa*. In 1810 (Trans. Linn. Soc. x. pp. 15-226) appeared Robert Brown's famous essay on "The Proteaceæ of Jussieu," but no mention is made of the genus *Diastella*, the species composing it being regarded by Brown as belonging to *Mimetes*—not, however, to the original *Mimetes* of Salisbury (Parad. Lond. sub n. 67), but to *Mimetes* in the wider sense which Brown himself gave to it.

If we now turn to Brown's account of *Mimetes*, we find that he subdivided the genus into two sections: (1) *Capitula axillaria*, (2) *Capitula terminalia*, *Mimetes spuria*, and I have found by a comparison of Salisbury's specimens (at Kew) with Brown's types at the British Museum that these two sections correspond respectively to the genera *Mimetes* Salisb. and *Diastella* Knight, thus:—

MIMETES R. Br.
  Sect. i. Capitula axillaria = *Mimetes* Salisb.
  Sect. ii. Capitula terminalia. Mimetes spuria = *Diastella* Knight.

Sprengel (Syst. Veg. i. 464) is the first author who mentions the genus *Diastella*, but he merely states that *Diastella bryiflora* Knight = *Leucospermum puberum* R. Br. Roemer & Schultes (Syst. Veg. iii. 266) and Steudel (Nomencl. Bot.) make the same statement, which by a comparison of the two herbaria proves to be incorrect; what we really find is that *D. bryiflora* Knight = *Mimetes thymelæoides* R. Br. The next important work bearing on our subject is Endlicher's *Genera Plantarum*, where the author (Suppl. iv. 2, p. 78) makes *Diastella* Knight a section of *Leucospermum* R. Br., but strangely enough keeps the plants to which Knight applied the name *Diastella* under the genus *Mimetes* R. Br. In his account of *Mimetes*, Endlicher subdivides the genus into two sections, *Eumimetes* and *Pseudomimetes*, which correspond exactly to Brown's sections. On comparison with the result already arrived at from Brown's account of *Mimetes*, the following table becomes clear:—

MIMETES R. Br.
  Sect. i. *Eumimetes* Endl. = capitula axillaria R. Br. = *Mimetes* Salisb.
  Sect. ii. *Pseudomimetes* Endl. = capitula terminalia R. Br. = *Diastella* Knight.

How Endlicher came to apply the name *Diastella* to a section of *Leucospermum* I do not know. Meisner (DC. Prod. xiv. pp. 259, 262, 264) follows Endlicher, and adopts the same names for the subdivisions of *Leucospermum* and *Mimetes*, as also does Engler (Pflanzenfam. iii. i. 135, 137); Bentham & Hooker (Gen. Pl.), while keeping *Diastella* as a synonym of *Leucospermum* R. Br., state that some species of the former genus belong to *Mimetes* R. Br. sect. *Pseudomimetes* Endl., thus:—

Leucospermum R. Br. = *Diastella* Knight (partly).
Mimetes R. Br.
Sect. i. Eumimetes Endl. = *Mimetes* Salisb.
Sect. ii. Pseudomimetes Endl. = *Diastella* Knight (partly).

The *Index Kewensis* takes us no further than Bentham and Hooker, as the following reductions given there will show:—

DIASTELLA Knight = LEUCOSPERMUM R. Br.
D. bryiflora Kn. = L. puberum R. Br.
D. ericæfolia Kn. = M. purpurea R. Br.
D. humifusa Kn.
D. myrtifolia Kn. = M. myrtifolia R. Br.
D. parilis Kn. = L. parile R. Br.
D. serpyllifolia Kn.
D. vacciniifolia Kn. = M. vacciniifolia (no authority).

After a careful comparison of Knight's types of *Diastella* with Brown's *Mimetes* I arrive at the following results:—

DIASTELLA Kn. = *Mimetes*, sect. ii. R. Br.
D. bryiflora Kn. = *M. thymelæoides* R. Br.
D. ericæfolia Kn. = *M. purpurea* R. Br.
D. humifusa Kn. (no specimen seen).
D. myrtifolia Kn. = *M. myrtifolia* R. Br., var. β.
D. parilis Kn. = *M. myrtifolia* R. Br., var. α.
D. serpyllifolia Kn. = *M. divaricata* R. Br.
D. vacciniifolia Kn. = *M. divaricata* R. Br.

All the authors dealt with above agree in subdividing *Mimetes* into two very defined sections (*Mimetes* Salisb. and *Diastella* Knight), but these sections differ so much in habit, structure, &c., that I have split Brown's *Mimetes* into two genera, and have kept up the names published by Knight.

GENERIC DIFFERENCES.

	Mimetes Salisb.	*Diastella* Knight.
Habit	Erect plants, rarely decumbent.	Prostrate shrubs, rarely erect.
Inflorescence ...	Capitula 3–13-flowered, partly hidden in the axils of the upper leaves, aggregated at the end of the branches; capitula oblong.	Capitula many-flowered, terminal, solitary, rarely 3-nate; capitula subglobose, often truncate.
Involucre-bracts	Membranous or coriaceous, usually showy and coloured.	Somewhat leathery, rarely conspicuous.
Style	$1\frac{1}{3}$–$2\frac{1}{4}$ in. long, glabrous.	$2\frac{3}{4}$–$4\frac{3}{4}$ lin. long, hairy below.
Stigma	$\frac{3}{4}$–3 lin. long, cylindric, linear, nodulose, or sinuate at the junction with the style (rarely gradually tapering into the style), sometimes swollen above.	$\frac{1}{6}$–$\frac{1}{4}$ lin. long, subclavate, gradually tapering into the style.

The principal references for the genera are as follow:—

DIASTELLA Salisb. apud Knight, Prot. 61 (1809).
Mimetes sect. ii. R. Br. in Trans. Linn. Soc. x. 109 (1810).
Mimetes sect. *Pseudomimetes* Endl. Gen. Pl. Suppl. iv. 2, 78; Meisn. in DC. Prodr. xiv. 264; Engler, Pflanzenfam. iii. i. 135.
non *Leucospermum* sect. *Diastella* Endl. l. c.; Meisn. op. cit. 269.
nec *Leucospermum* (partim) Benth. & Hook. Gen. Pl. iii. 170; Engl. op. cit. 137.

MIMETES Salisb. Parad. sub n. 67 (1807).
Mimetes sect. i. R. Br. l. c.
Mimetes sect. *Eumimetes* Endl. l. c.; Meisn. op. cit. 262; Benth. & Hook. op. cit. 171; Engl. op. cit. 135.

LEICESTERSHIRE PLANTS (1905–1910).

By A. R. HORWOOD.

SOME six years have elapsed [*] since any additional notes upon the distribution of flowering plants in Leicestershire have appeared; and as the Flora of 1886 is now very out-of-date, and during this interval much of interest has accumulated, I publish these records as a further contribution to the county flora. The results here set forth are the joint work of several botanists and others whose names appear below; but especial mention should be made of the share taken by the Rev. H. P. Reader in this recent work. He has been the constant companion (as well as botanical guide) of the writer on excursions made with the object of surveying the county anew botanically, and the following notes are, except where the initials of other workers are cited, our joint work. An asterisk denotes a new record; a dagger stands for plants of alien origin.

In one or two works that have been overlooked in compiling the Flora, some records of interest occur that we have incorporated with the recent notes. In one of these by the Rev. Irwin Eller,[†] the author states that a number of plants were "planted" in the Belvoir district, e. g. *Acorus Calamus*, Muston; *Silene nutans*, Stathern; *Aster Tripolium*, Vale of Belvoir; *Inula Pulicaria*, Muston; *Lepidium latifolium*, Muston; *Thlaspi arvense*, Stathern; *Geranium lucidum*, Stathern; *Leonurus Cardiaca*, Stathern; *Trifolium subterraneum*, Muston; *Medicago maculata*, Muston; *Myrrhis Odorata*, Belvoir. Some of these are found, it is true, as casuals. Others are not native, and we should be quite at a loss to account for their occurrence in these stations had no such statement been published. As the book is rare we have cited the cases alluded to here, so that others may be on their guard.

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[*] See Journ. Bot. 1904, pp. 337–349; 1906, pp. 261–266.

[†] *History of Belvoir Castle*, 1841, Appendix.

Of a similar kind is a nuisance which may be of a more widespread nature. In this part of the country, at any rate, it is the custom of herbalists to travel (they are often railway guards) far afield in search of plants used medicinally, and to root them up and bring them home, and plant them in or near their houses, *e. g.* on railway banks. This has a twofold artificial effect: (*a*) plants are redistributed by man; (*b*) laid open to extermination in their original habitats. I have not seen this practice described before, and it may serve to explain some present anomalies of distribution.

Owing to one cause or another the following plants, moreover, have disappeared from v.-c. 55 since 1886:—*Arabis hirsuta*, *Dianthus deltoides*, *Sagina nodosa*, *Hypericum elodes*, *Trifolium glomeratum*, *Lathyrus palustris*, *Drosera rotundifolia*, *D. anglica*, *Sium latifolium*, *Œnanthe silaifolia*, *Antennaria dioica*, *Inula Pulicaria*, *Anthemis nobilis*, *Senecio campestris*, *Arnoseris pusilla*, *Crepis paludosa*, *Hypochæris glabra*, *Vaccinium Vitis-idæa*, *Anagallis tenella*, *Gentiana Pneumonanthe*, *Limosella aquatica*, *Orobanche major*, *O. purpurea*, *Pinguicula vulgaris*, *Mentha piperita*, *M. gentilis*, *Calamintha Nepeta*, *Littorella juncea*, *Polygonum minus*, *Rumex pulcher*, *Aristolochia Clematitis*, *Empetrum nigrum*, *Spiranthes autumnalis*, *Orchis ustulata* (? an error), *Habenaria bifolia*, *Ruscus aculeatus*, *Tofieldia palustris*, *Luzula Forsteri*, *Scirpus pauciflorus*, *S. cæspitosus*, *Rynchospora alba*, *Schœnus nigricans*, *Carex dioica*, *C. filiformis*, *Asplenium Adiantum-nigrum*,* *A. Trichomanes*,* *A. viride*, *Cystopteris fragilis*, *Lastræa Thelypteris*, *Osmunda regalis*, *Lycopodium Selago*, *L. inundatum*, *L. clavatum*, *Pilularia globulifera*.

These are mentioned here in case any of them are still known to occur in localities in Leicestershire unknown to us, and as a supplement to the list of Cryptogams cited as extinct here since 1886.†

W. B. = W. Bell.—L. S. B. = L. S. Biggs (Leicester Museum).—J. B. = J. Bradshaw.—B. E. C. R. = Botanical Exchange Club Reports. — E. F. C. = E. F. Cooper. — I. E. = The Rev. Irwin Eller.—T. R. G. = T. R. Goddard (Leicester Museum).—A. R. H. = Author's initials.—C. B. H. = C. B. Headley.—J. E. J. = J. E. Jordan. — F. L. F. K. = Mrs. F. L. Foord-Kelcey. — E. E. L. = E. E. Lowe (Leicester Museum).—G. M. = G. Mercer.—H. P. R. = Rev. H. P. Reader. — T. E. R. = T. E. Routh. — N. H. T. = *Natural History of Tutbury*, Sir Oswald Mosley, 1863, Appendix by E. Brown.—W. A. V. = W. A. Vice.—W. B. E. C. = Watson Botanical Exchange Club Reports.

The order followed is that of the tenth edition of the *London Catalogue.*

Thanks are due to the Rev. W. Moyle Rogers, E. F. Linton, Prof. E. Hackel, Messrs. J. E. Bagnall, Arthur Bennett, H. and J. Groves, and J. W. White for naming several of the more critical species.

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* Found where probably they have been planted recently, but not in truly native habitats.

† See Journ. Bot. August, 1907.

Clematis Vitalba L. Martinshaw Wood, *C. B. H.* (W. B. E. C. 1906). Certainly not indigenous here, nor apparently anywhere in the county.

Anemone nemorosa L. Cotesbach. — †*A. ranunculoides* L. Piper's Hole, Croxton Kerrial, *I. E.* Doubtless an escape.

*†*Adonis annua* L. (= *autumnalis* L.). Moira (N. H. T.). Evington, *J. B.* Abbey Park, *F. Russell.*

Ranunculus circinatus Sibth. Moira (N. H. T.). — *R. trichophyllus* Chaix. Scraptoft. — *R. Drouetii* F. Schultz. Ratcliffe, Scraptoft, Stonton Wyville. — *R. heterophyllus* Weber. Bracklebridge (W. B. E. C. 1907). — *R. peltatus* Schrank. Six Hills, Cropston Reservoir, terrestrial form, Lowesby (W. B. E. C. 1906). Hallaton. — Var. **truncatus* (Hiern). East side of Groby Pool, *A. R. H.* — Var. *floribundus* (Bab.). Stoney Stanton, *W. B.* (W. B. E. C. 1906). — Var. *penicillatus* (Hiern). Blaby Brook, *W. A. V.* (W. B. E. C. 1905).—*R. Flammula* L. Form approaching b. *radicans* Nolte. Cropston Reservoir.—*R. acris* L. c. *Borœanus* Jord. Leicester, *C. B. H.* (W. B. E. C. 1906). Barkby, *W. B.* (W. B. E. C. 1908). — *R. sardous* Crantz. Aylestone, *L. S. B.*— *R. Ficaria* L. var. *incumbens* F. Schultz. Ratcliffe. Also a stoloniferous form with sinuous leaf margin. A dwarf form of the type was found down by the Great Stretton Brook.

Caltha palustris L. b. *Guerangerii* (Bor.). Botcheston, *L. P. S.* Aylestone, Gracedieu, *H. P. R.*

*†*Eranthis hyemalis* Salisb. South Croxton, Long Spinney, Scraptoft.

Berberis vulgaris L. Moira (N. H. T.). Blaston.

Castalia alba Wood. Market Harborough.

Papaver Rhœas L. var. *Pryorii* Druce. Lowesby.—*P. Lecoqii* Lamotte. Aylestone, *L. S. B.* Stony Stanton, Medbourne.

†*Glaucium phœniceum* Crantz. Belgrave, *G. M.*

*†*Neckera bulbosa.* Knighton, *W. B.* Wanlip.

†*Corydalis lutea* DC. Walton.

Fumaria officinalis L. Form with retuse fruit. Knighton, *W. B.* (W. B. E. C. 1907).—*†*F. densiflora* DC. Rothley Plain, established *W. B.*

**Radicula Nasturtium-aquaticum* R. & B. var. *siifolia* R. & B. Scraptoft, *A. R. H.*

Arabis glabra Bernh. Woodville (N. H. T.).

Cardamine amara L. Botcheston Bog. Gracedieu, *W. B.*— *C. flexuosa* With. Newtown Unthank, Launde, Gaddesby, Hallaton, Medbourne. Great Glenn, *T. R. G.* Cropstone, Glenfield, *L. S. B.* Hoby, *W. B.* (W. B. E. C. 1910).

Erophila verna E. Meyer. Croft, *W. B.* (W. B. E. C. 1907). Ratcliffe. — b. *majuscula* (Jord.). — c. *stenocarpa* (Jord.). Croft, *W. B.* (W. B. E. C. 1907).—*E. prœcox* DC. Blaby, *W. A. V.* (W. B. E. C. 1905), with unusual leaf characters. Croft Quarry, *W. B.* (W. B. E. C. 1907).

†*Cochlearia Armoracia* L. Medbourne, Market Harborough, on the Leicester road. Birstall, *G. M.*

Hesperis matronalis L. Blaston.

Sisymbrium Thalianum Gay. Buddon Wood, Bagworth, Wanlip, Kirby Muxloe.—*S. officinale* Scop. var. *leiocarpum* DC. New Humberstone. — *†*S. Irio* L. New Burton and Ashby Road (N. H. T.).

Erysimum cheiranthoides L. Thurmaston, Aylestone, *L. S. B.* Ingarsby, Spinney Hill Park, New Humberstone.

*†*Euclidium syriacum.* Blaby Mill, *W. A. V.* (W. B. E. C. 1905). Introduced in foreign corn.

Camelina sativa Crantz. Elmesthorpe. — b. *fœtida* (Fr.). Aylestone.

Brassica Napus L. Tilton, Medbourne, Stony Stanton, Old Humberstone, Branston, Hallaton.—*B. rapa* L. Aylestone, *L. S. B.* —*B. nigra* Koch. Stony Stanton.—*B. alba* Boiss. Desford Station.

Diplotaxis muralis DC. b. *Babingtonii* Syme. Market Harborough.

Coronopus procumbens Gilib. Overseal (N. H. T.). New Humberstone, Scraptoft. This is one of the most long-lived of plants when placed in water in a vase. A specimen exhibited on the flower-table of the Leicester Museum lasted three months, water being changed weekly.

Lepidium ruderale L. West Bridge, Thurnby, Aylestone, New Humberstone, Foston. — *†*L. sativum* L. Woodhouse Eaves, *H. P. R.* Aylestone, *L. S. B.*—†*L. Draba* L. New Humberstone, West Bridge, Desford.

Thlaspi arvense L. Crown Hills, *J. E. J.* Great Easton.

Raphanus Raphanistrum L. b. *sulphureum.* Billesdon Coplow. Aylestone.

Reseda lutea L. Between Saltby and Sproxton, *H. P. R.* Belgrave Birstall, *G. M.* Groby, *L. S. B.* Saxby, *R. Barnes.*—*R. Luteola* L. West Bridge, Birstall, *G. M.* Saxby, *R. Barnes.*

Viola odorata L. × *V. hirta* L. (= *V. sepincola* Jord.). Wymondham, *C. B. H.* — *V. hirta* L. Breedon Cloud Wood (N. H. T.). Ratcliffe, Tilton Hill, Baggrave Blaston, Hallaton, Wymondham, *C. B. H.*—*V. hirta* × *odorata* (= *V. permixta* Jord.).—*V. calcarea* Greg. Near Ingarsby Tunnel, 1906.—*V. sylvestris* Kit. Burbage Wood, Thurlaston.—*V. canina* L. Bardon Hill, *W. B.* (W. B. E. C. 1907). Not typical.—*V. arvensis* Murr. a. *agrestis* Jord. Stoughton, South Knighton, *W. B.* (B. E. C. R. 1908). — f. *segetalis* (Jord.). Syston, *A. R. H.* Lutterworth, *W. B.* (B. E. C. R. 1908).—b. *obtusifolia* (Jord.). Forest East (W. B. E. C. 1910). — c. *Lloydii* (Jord.). Abbey Park (B. E. C. R. 1908). Blackbird Lane, *W. B.* (B. E. C. R. 1908). Of the first Dr. Drabble says "it may be a large-flowered form, due to rich soil." Of the second (*ibid.*) he says "not typical."—e. *subtilis* (Jord.). Branston, Saltby, *A. R. H.* —*arvatica* (Jord.). Knighton, *W. B.* (W. B. E. C. 1910).—*Timbali* (Jord.). Oadby, *W. B.* (W. B. E. C. 1907). Dr. Drabble calls this a small and delicate state. — *Kitaibeliana* Roem. & Schultz. Oadby, *W. B.*

Polygala serpyllacea Weihe. Baggrave, Burbage Common. Roecliffe, *W. B.* (W. B. E. C. 1906).

†*Saponaria officinalis* L. Aylestone. Birstall, *G. M.*

Silene latifolia R. & B. Tilton, Aylestone, *L. S. B.* Birstall, *G. M.* Branston, Saltby.—b. *puberula* (Jord.). Waltham, *F. L. F. K.* (B. E. C. R. 1907).—*S. noctiflora* L. Moira (N. H. T.). Branston, Saltby, Arnesby, Goadby Marwood.—†*S. dichotoma* Ehrh. Evington, *J. B.*

Lychnis dioica L. *fl. albo.* Tilton, *L. S. B.* King's Norton, Marefield. In botanical district [illegible] of the county (as defined in the Flora of 1886), or between Rugby and Lutterworth, this species does not occur, a fact which must be correlated doubtless with the absence also of *Mercurialis perennis* and the scarcity of *Arum maculatum.*—*L. Githago* Scop. Kirby Muxloe, Desford, *L. S. B.* Evington, *J. B.* South Croxton, Ragdale.

Cerastium semidecandrum L. Breedon (N. H. T.). On old walls and dry places about Stathern, *I. E.*—*C. arvense* L. Swithland, Lowesby.

Stellaria apetala Ucria. Kirby Muxloe. —*S. neglecta* Weihe. Narborough Bog, *L. S. B.* — b. *umbrosa* (Opiz). Botcheston, between Newtown Unthank and Kirby Muxloe.—c. *decipiens* E. S. Marsh. Newtown Unthank. Cropstone Reservoir, *L. S. B.* Narborough, *C. B. H.* The tubercles rather rounded, and in this respect, according to Mr. C. E. Salmon, agreeing with a plant from S. Croxton referred to *S. neglecta.*—*S. uliginosa* Murr. Seal Wood (N. H. T.). Desford, Baggrave, Aylestone, *L. S. B.*

*†*Spergula sativa* Boenn. Ashby Parva, 1910, *H. P. R.*

Spergularia rubra Pers. Windmill Hill, Woodhouse Eaves.

Hypericum maculatum Crantz. Whitwick (N. H. T.). Ulverscroft. — *H. humifusum* L. Billesdon Coplow, Ashby Parva. — *H. pulchrum* L. Newtown Linford.

Malva moschata L. Harby, Belvoir, *I. E.* Sanvey Castle, Lowesby Hill, Aylestone, New Humberstone. Cropstone, *T. R. G.* Mountsorrel, *E. E. L.* This plant is apparently especially characteristic of the marlstone formation and sandy soils generally.—*M. rotundifolia* L. Walton. Packington (N. H. T.).—†*M. pusilla* Sm. Ratby.

Tilia cordata Mill. Swithland Wood, *W. B.* (B. E. C. R. 1907).

†*Linum usitatissimum* L. Amongst corn, Eastwell, *I. E.* Aylestone, New Humberstone, Old Humberstone, Glen Parva.

†*Geranium phæum* L. Aylestone, *L. S. B.* — *G. pyrenaicum* Burm. fil. R. Soar, Thurmaston, *G. M.* Railway banks, near Glen Parva, *W. A. V.*—*G. pusillum* L. Overseal (N. H. T.). Walton, Medbourne, Branston. — *G. lucidum* L. Wanlip. Castle Donington, *L. & P. S.* — *G. Robertianum* L. *fl. alba.* Stoughton, Tilton, Burbage.

Erodium cicutarium L'Hérit. Branston. Birstall, *G. M.*

Oxalis Acetosella L. Croxton Park, *I. E.* Launde, Blaston. Scalford.

Rhamnus Frangula L. Woolsthorpe, *I. E.*

Acer campestre L. b. *leiocarpon* Wallr. Lowesby. Knighton Road, *W. B.* (W. B. E. C. 1907).

Genista tinctoria L. Croft, Burbage, Stathern, Saltby.

Cytisus scoparius Link. Seal Wood (N. H. T.).

Ononis spinosa L. Keyham. A white-flowered form occurs here.—*O. repens* L. Billesdon Coplow, Saltby.

†*Medicago sativa* L. New Humberstone, Marefield, Syston, Laughton. Mountsorrel, *E. E. L.* Between Edmonthorpe and Wymondham, *R. Barnes.*—*M. denticulata* Willd. Birstall, *G. M.* —*M. arabica* Huds. East side of Charnwood Forest (N. H. T.). Belgrave, *G. M.* Wanlip, *G. M.*

Melilotus altissima Thuill. West Bridge, Belgrave Pumping Station, Aylestone, Glen Parva, Church Langton. Smeeton, *T. R. G.* —*M. officinalis* Lam. (= *M. arvensis* Wallr.). Evington, *J. B.* Belgrave, *G. M.* New Humberstone.

Trifolium medium L. Moira (N. H. T.). Burbage, Keyham, Stathern, Branstone. Aylestone, *L. S. B.* — *†*T. ochroleucon* Huds. Mountsorrel, *E. E. L.* — *T. arvense* L. Birstall, *G. M.* Mountsorrel, *E. E. L.* — *T. striatum* L. Tilton Hill, Cropstone, Sproxton. — †*T. hybridum* L. South Croxton, Tilton, Branstone. —*T. fragiferum* L. Houghton, King's Norton, E. Langton, Arnesby, Sproxton.

Anthyllis Vulneraria L. Laughton Hill, Wigston Station. Mountsorrel, *E. E. L.*

Lotus tenuis Waldst. & Kit. Woodville (N. H. T.). Near Birstall.

Onobrychis viciæfolia Scop. Mountsorrel, *E. E. L.* Between Edmonthorpe and Wymondham, *R. Barnes.*

(To be continued.)

SHORT NOTES.

New County Records in Bryophyta.—The following Mosses and Hepatics are new for the counties of Westmorland and Ayr respectively. I have been kindly helped by Messrs. Wheldon and Ingham in naming them. In June, 1910, I found, in Mardale, v.-c. 69, *Meesia trichoides* Spruce, in fruit, and *Brachythecium plumosum* B. & S. var. *nomomallum* Schimp. In Riggindale, *Bazzania tricrenata* (Wahl.), Trevis. In August, 1910, I found, at Craig Lure, Ayrshire, v.-c. 75, *Sphagnum compactum* De Cand. var. *subsquarrosum* W., *S. rubellum* Wils. var. *versicolor*; at Balbeg, *S. rubellum* var. *purpurascens* W.; and the rare hepatic, *Pleurozia purpurea* (Lightf.) Lindl. at Craig Lure. — Eleonora Armitage.

Mentha alopecuroides in East Suffolk (v.-c. 25).—I cannot find any mention of this as a Suffolk plant in Hind's "Flora," Supp. to Top. Bot., &c., but a fine example of it exists in the herbarium of the Holmesdale Natural History Club, Reigate, labelled "Oakley, Suffolk. Rev. H. Kirby." The specimen came from Dr. J. A. Power's collection, and was probably gathered seventy or eighty years ago. Messrs. W. R. & E. F. Linton confirmed the name some time ago.—C. E. Salmon.

THALICTRUM DUNENSE Dum. IN CORNWALL.—Having recently had occasion to go over my collection of *Thalictrum* specimens, I was much surprised to find a sheet containing three plants gathered on June 22nd, 1899, by Mr. A. O. Hume, at the Rill Head, Lizard, which answer to all the descriptions of *T. dunense* that I have been able to consult, as well as agree in every detail with authorized specimens which I possess from Sutherlandshire. Mr. Hume, with whom I have been in communication on the subject, informs me that his specimens of the same gathering are perfectly identical with plants in his herbarium obtained from several British localities, and he has not the slightest doubt that they are all *T. dunense*. A few weeks ago Miss C. E. Larter sent me several plants of this species, which she had collected near Torquay. This, I believe, is also a first record for Devon.—F. HAMILTON DAVEY.

REVIEWS.

The Distribution of Hepaticæ in Scotland. By SYMERS M. MACVICAR. 8vo, wrapper, pp. vi. 336 (Transactions of the Botanical Society of Edinburgh, vol. xxv. 1910).

THIS is an important work, and as the writer states in the preface "is a new departure for Scotland, in this branch of botany." It begins with some very short "historical" notes of all the botanists who have worked more or less at the Hepatics of Scotland, and gives the additions made by each to the Flora of Scotland, from Sir Robert Sibbald (1641–1722), down to the present day. Then follow some "general notes on the flora and rainfall," and on "Atlantic" species. Next comes a comparison of the Hepatic Flora of Scotland with that of other countries, which is a valuable contribution to our knowledge of their distribution in the northern hemisphere. A "sketch of the flora of the Watsonian provinces" brings into prominence the fact that the presence or absence of Hepatics in any country is largely a question of climate and heavy rainfall, and shelter or shade in places from the direct rays of the sun.

The author has not overlooked the "associations" of the Hepatics—a branch of their ecology which has hitherto been untouched by any writer on the botany of the British Islands, and of which doubtless much more can be made. The successful introduction given will act as a stimulus to other investigators in this fascinating department of field botany.

The list given at p. 49 of "Works quoted" strangely omits the following, all of which are referred to in this book:—*Census Catalogue of British Hepatics* (1905); *Transactions of the Botanical Society of Edinburgh*, vol. i.; *Transactions*, do. for 1902; *Transactions of Dumfries Natural History Society*, 1887–90; *Phytologist*, 1842. A bibliography or list of the literature of the Scottish Hepatics would have enhanced the usefulness and completeness of the work, and would have enabled Mr. Macvicar to record in their proper place his own numerous contributions to the Hepaticology of North Britain, only one of which is named in this book.

The body of the work, pp. 50–330, consists of the "Distribution of the Species." Each has first a summary of its distribution, together with any particulars about the plant that are worth mentioning or likely to assist the student in diagnosing it. Then come the localities in the sub-counties, the names of which are printed in full with the name of the first collector in each; in many cases the vertical range or ascent of the plant is also given. The nomenclature used is that of the *Census Catalogue of British Hepatics*, except in the cases of *Leptoscyphus* and *Calypogeia*, which formerly were *Mylia* and *Kantia*.

The divisions into the sub-provinces and vice-counties of Watson (without, however, the numbers of each) are followed throughout, except, as the author intimates, in certain localities where he has made some alterations in the boundaries. These alterations, it seems, affect Watson's sub-provinces 29 and 32; but to understand what is done here would require a better map of Scotland than that in the second edition of *Topographical Botany*. Vice-counties 86, 87, 88, and 89 have been divided and distributed, and their names changed. This bit of Watson's work has thus been put into the melting-pot, and experience alone will show whether confusion will not ensue. All these divisions of provinces, &c., are artificial, but they have their useful points, and have been employed now for upwards of thirty years by botanists throughout the United Kingdom.

A grateful list is included of all those persons who assisted Mr. Macvicar in collecting specimens, and we are informed that every plant was examined by him before being recorded. Those who have experienced his scrupulous care in naming critical plants will know what a guarantee this is for the reliability of the records. He adds that "a few records have been taken from literature, but they have been almost confined to works by specialists on the subject, and each of these records is indicated by a special mark in the context, as the specimens upon which they were founded have not been examined by the author as have all others with the exception of five or six which are marked *in litt.*" This affords one some idea of the time which must have been spent on the work.

Admirable as it is in other respects, the book has one serious defect: there is no index to the species it contains!

C. H. Lett.

Die Palæobotanische Litteratur. Edited by W. J. Jongmans. 8vo, pp. 217. Jena: G. Fisher. 1910. Price 7 marks.

There are few workers engaged in scientific research who are not constantly handicapped by the absence of a complete bibliography of the subject which they are investigating. In the department of palæobotany this is especially the case, because the number of published papers is so great and they are so widely scattered in different journals. It is therefore very gratifying to learn that Dr. Jongmans has undertaken the important work of editing a bibliography, the first number of which has now appeared. This contains only references to papers published in 1908, and it is proposed to publish similar annual numbers, in addition to a bibliography of the works published before that date. This cannot but be a somewhat laborious task, and the editor in his preface invites the co-operation of all who are interested in the subject, especially asking authors of papers on palæobotanical subjects to forward separate copies of their papers to him.

The work is divided into two parts. The first gives a list, under authors' names, of the papers of 1908. The second part is an index to the plants mentioned in those papers, and gives the geological formation in which any one plant occurs, the name of the author by whom it is mentioned, together with references which, by turning to part i., indicate the exact place where the reference is to be found. This subject-index appears to be very complete, and has been carefully compiled. The scope of the index is a wide one, and includes not merely works of purely palæobotanical interest, but also some geological and botanical publications bearing on the study of fossil plants.

A few misprints have crept in, but the work will be invaluable to palæobotanists and, owing to the numerous references to Tertiary plants, to many workers in systematic botany. It is to be hoped that Dr. Jongmans will receive the encouragement and help which he deserves in the production of future parts of this work, and that the example which he has set will be followed by the production of similar bibliographies for the other branches of botany.

H. H. T.

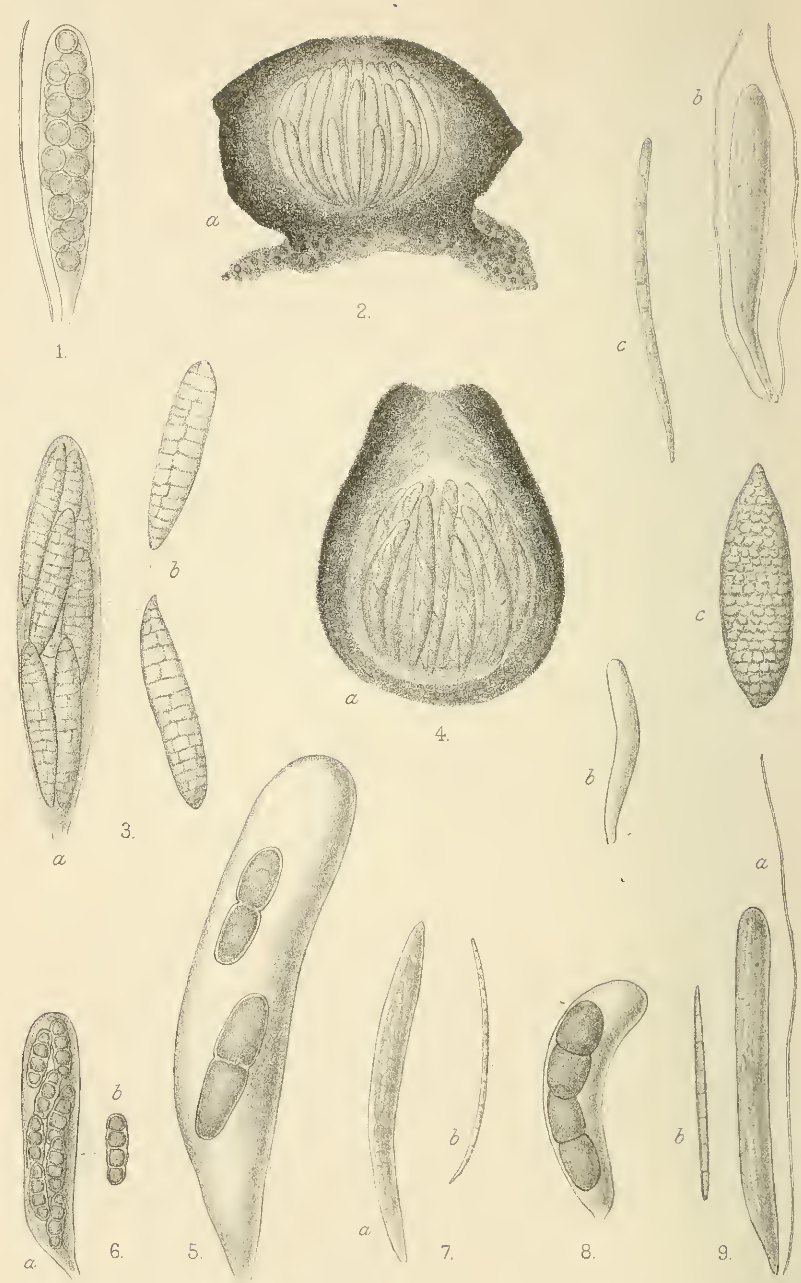
BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on Dec. 1, Mr. G. C. Druce exhibited *Utricularia ochroleuca* Hartm. and *U. Bremii* Heer, new records from Ireland, with *Arabis alpina* Linn. and *Chærophyllum aureum* Linn., from Scotland, the latter in confirmation of George Don's statement, which had been doubted during the last century. Miss Ida M. Hayward exhibited eighteen alien plants selected from about two hundred, which had been noted by the side of the river Tweed, and its tributary the Gala. The chief industry of the locality is in wool, which is brought from various parts of the world, and frequently has fruits and seeds entangled in the staple to an injurious extent. Various species of *Medicago*, natives of the Mediterranean region, have become naturalized in Australia, and their prickly fruits form the most harmful of these additions to the fleece. The winter destroys practically all of these aliens, but a new supply is forthcoming during the following year.

Rather more than three years ago (Journ. Bot. 1907, 349) we noticed the first volume of a very beautiful quarto book on the *Wild Flowers of the British Isles* by Mrs. H. Isabel Adams, published by Mr. Heinemann at 30*s.* net. We there pointed out that there was no indication in the volume then under notice that it would be followed by another, but we are glad to find that it has been found possible to issue the second, which is now before us, and completes the work so far as it is intended to be completed. Unfortunately this does not go the whole way: the title-page excludes the "water-plants and trees," but, besides these, all save the petaloid monocotyledons are also excluded. Moreover, only a selection of the species of such genera as *Polygonum* and *Rumex* is figured; so that the book will appeal rather to the lover of beautiful plates than to the practical botanist, although the descriptive portion, in which Mr. Bagnall has rendered much assistance, is very fully and carefully done. All that we said in praise of the plates and of the general get-up of the first volume applies equally to this; the dissections of the flowers, so often omitted from popular books, are drawn and coloured with much care, and as an example of colour-printing the plates would be difficult to beat.

The first number has appeared of a new and handsome magazine edited from the Cambridge University Press by Dr. Bateson and Professor Punnett, and entitled the *Journal of Genetics*. It is for the publication of records of original research in heredity, variation, and allied subjects, and will appear in parts as material accumulates; it is expected that four parts, forming a volume, will appear annually. The subscription price for a volume is 30*s.* net; for each part 10*s.* net. The contents of the number before us are mainly botanical and include papers by Prof. Keeble and Miss Pellew on "White-flowered Varieties of *Primula sinenis*" and on "The Mode of Inheritance and Stature and of Time of Flowering in Peas"; a long paper, illustrated by twenty-nine plates, by Dr. R. N. Salaman on "The Inheritance of Colour and other Characters in the Potato"; and a paper by Mr. E. R. Saunders on "The Inheritance of Doubleness in *Petunia*."

An important quarto work on *Plants Indigenous to the Colony of Victoria* was begun by Baron von Mueller in 1860, but was subsequently abandoned. A number of plates had however been prepared for its continuation, and these, with a few additions and some notes on each, are now issued by Prof. Ewart as a second volume. The author's views on nomenclature are hardly in accordance with those of the Vienna Congress, as is shown by his remark on p. 31 that "there is no need to manufacture trouble by reverting to the older specific name." Under *Xyris gracilis* reference should have been made to Dr. Rendle's paper in this Journal for 1899, from which it would appear (p. 502) that *X. juncea*, which Prof. Ewart follows Bentham in combining with *X. gracilis*, is "quite distinct" from that species.


1.
a
2.
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b
9.

A. L. S. del.
P. Highley lith.

West, Newman imp.

New Lichens.

NEW LICHENS.

By A. Lorrain Smith, F.L.S.

(Plate 510.)

Several of the species of lichens described below were collected by well-known lichenologists many years ago, and are preserved in the herbarium of the British Museum. At that time less use was made of the microscope for purposes of determination than in our day of improved optical instruments; the microscope, however, must always be the final criterion in the case of plants that are classified chiefly on their microscopical characters. Field identification by trained naturalists is marvellously accurate, but mistakes are liable to occur unless constant use is made of high powers of magnification.

Other species, collected recently, were sent to me on various occasions for identification, and have proved to be of extreme interest. It is with great pleasure that I tender my thanks to the various donors. They will all be included in the forthcoming second volume of the *Monograph of British Lichens*, the first volume of which was prepared by the late Rev. J. M. Crombie and has been before the public for some years.

Lecidea pleiospora, sp. n. Thallus tenuis, virescens, indistinctus. Apothecia minuta, immarginata, circa 0·250 mm. diam., nigro-fusca, intus rufescentia, disco fusco-rubro; hypothecio angustato, etiam fusco-rubro; paraphysibus paucis, gracilibus, conglutinatibus; ascis oblongo-clavatis, circa 0·075 mm. longis, 0·012 mm. crassis; sporis 12 ad 18 in ascis, globosis vel leviter angulatis, episporio distincto instructis, hyalinis, 0·006–8 mm. diam.

Ad terram argillaceam.

Belongs to the *Biatora* section of *Lecidea*, near to *L. rubidula*. Collected by the Rev. H. P. Reader in November on the soil of a disused clay-pit at Little Bowden, Northants. The thallus becomes a dull dark green when dry. The apothecia are fairly abundant. The species is distinguished from others by the many-spored ascus, and by the irregularly globose spores.

Verrucaria prominula var. minor, var. nov. Thallus tenuis tartareus, cinereo-albidus vel subfuscus. Pentheciis numerosis, sparsis, minoribus quam typi iis; sporis ellipsoideis, hyalinis, 0·014–17 mm. longis, 0·006–7 mm. crassis.

Ad saxa maritima.

Collected at Nanorbee, Tenby, Pembrokeshire, by the late W. Phillips.

Gongylia Koerb. Syst. Lich. Germ. p. 351 (1855).

Thallus crustaceous, not corticated. Agal cells *Pleurococcus*. Perithecia almost sessile, soft in texture, bright or dark-coloured, with a poriform ostiole; paraphyses slender, free; asci 4–8-spored; spores acicular, straight or somewhat bent, colourless, multiseptate.

A small well-marked genus, belonging to the *Verrucariaceæ*, with representatives in North and Central Europe; now for the first time discovered in Great Britain.

Gongylia viridis, sp. n. Thallus primum læte-virescens, tenuis, effusus. Perithecia numerosa, in statu humecto nitido-nigra, globosa, ad basim leviter immersa, ostiolis distinctis amplius dehiscentibus; tunica externa nigra, mollis, dimidiata, interne nigro-smaragdina; ascis elongato-clavatis ad basim curvatis, circa 0·140 mm. longis, 0·010–12 mm. latis; paraphysibus longioribus quam ascis, numerosis, filiformibus; sporis angustate fusiformi-acicularibus, subito sursum angustatis vel apice obtusis, ad basim sensim decrescentibus, 0·060–65 vel –85 mm. longis, 0·002–3 mm. latis.

Ad terram arenaceam.

Collected in the early months of 1910 by Mr. B. W. J. Starling on the side of a footpath near Horsley, Surrey, and communicated to me by Mr. A. W. Dennis. It is interesting to note that the same species was gathered last autumn at two different localities in Epping Forest, near Theydon Bois and near Loughton. It is nearly allied to *G. sabuletorum*, a species recorded from Central Europe, but differs in the thallus and in the much longer spores.

Microglæna Larbalestierii, sp. n. Thallus tenuis subbrunneus mucilaginus, vel, in statu sicco, rimosus, rugosus, sparsus. Perithecia in thallo immersa, conica, ostiolis tantum notata, tunica ad basim hyalina, paraphysibus gracilibus, numerosis; ascis magnis oblongo-cylindraceis; sporis octonis, oblongo-fusiformibus, hyalinis, muriformibus, circa 0·050–55 mm. longis, 0·010 mm. latis.

Ad saxa in flumine.

Collected by Mr. C. Larbalestier at Twelve Pins, Connemara, Galway. It belongs to this genus by its well-developed paraphyses and by its muriform spores with many transverse septa and one or more longitudinal divisions. It differs from other species by the habitat and structure, and by the large subfusiform spores.

Microglæna Holliana, sp. n. Thallus effusus, àlbidus, tenuis vel obsoletus. Perithecia fusca, conica, semi-immersa, in statu humecta læte-brunnea, sparsa vel interdum conferta, raro due vel plura inter sese cohærentia; tunica ad basim hyalina supra læte-brunnea; paraphysibus gracilibus paucis; ascis elongato-oblongis; sporis octonis, magnis, ellipsoideo-fusiformibus, interdum medio leviter constrictis, muriformibus, 0·050–60 mm. longis, 0·015–17 mm. latis, cellulis parvis.

Ad terram, ad thallum *Cladoniæ*, ad muscos, &c.

Collected by the late H. B. Holl at Dolgelly, Merioneth. The squamules of the *Cladonia* are dotted with the clear brown conical perithecia.

Arthopyrenia areniseda, sp. n. Thallus albido-cinereus, continuus, granulosus, leviter furfuraceus. Perithecia minuta, nigra, semi-immersa, subglobosa, integra, ostiolo lato notata; paraphysibus numerosis, gracilibus, ramosis; ascis elongatis, utrinque angustatis, circa 0·140 mm. longis, 0·025 mm. latis; sporis normaliter octonis, elongato-clavatis, sursum latioribus, interdum guttulatis, hyalinis, 1-septatis, majusculis, 0·032–37 mm. longis, 0·010 mm. latis.

Ad litora humida arenacea.

Collected at Formby, Lancashire, by Mr. J. A. Wheldon in spring. The thin grey thallus follows the inequalities of the substratum. The scanty algal symbiont, *Trentepohlia*, has the deep yellow colour of the gonidia characteristic of many maritime species. The perithecia are few and inconspicuous; the spores resemble in form those of *A. epidermidis*, but they are much larger.

Arthopyrenia foveolata, sp. n. Thallus tenuis subflavovirescens vel obsoletus. Perithecia minuta, nigra submersa, foveolata, subintegra; tunica superne nigra ad basim brunnea; paraphysibus paucis vel obsoletis; ascis cylindraceo-clavatis, 0·070–80 mm. longis, 0·017 mm. crassis; sporis octonis, 1-septatis, hyalinis, oblongo-ovatis, utrinque angustatis, 0·015–18 mm. longis, 0·006-7 mm. latis.

Ad conchas mari ejectas.

Collected by Mr. E. M. Holmes at Robin Hood's Bay, Yorkshire. It differs from *A. litoralis*, which also grows on shells, in the size of the perithecia, and in their immersion in the substance of the shell.

ARTHOPYRENIA HALODYTES var. HOLLII, var. nov. Thallus lurido-nigrus, late effusus, minute rimoso-areolatus. Perithecia similia typi iis.

Ad saxa maritima.

Collected by the late H. B. Holl on rocks near the sea between Barmouth and Dolgelly, Merioneth. The thallus covers considerable patches with a thin blackish crust; the minute areolation is only visible under high magnification, but is sufficiently marked to give the whole plant a scabrid appearance.

Arthopyrenia Crombiei, sp. n. Thallus effusus, tenuis, subflavus, vel rubro-fuscus, subnitidus. Perithecia sparsa, minuta, hemispherica, dimidiata, immersa, ostiolo minuto notata; ascis obovato-cylindraceis, circa 0·055 mm. longis, 0·017–20 mm. latis; paraphysibus paucis, confertis; sporis octonis, oblongo-clavatis, 3-septatis, 0·020–22 mm. longis, 0·005–6 mm. latis.

Ad corticem arborum (*Alni*).

Collected by the late J. M. Crombie on the banks of the Garry, Blair-Athole, Perthshire. It is closely allied to *A. submicans*, but differs in the form of the spores, which tend to break up into halves, and also in the presence of the rather stoutish paraphyses.

Leptorhaphis Carrollii, sp. n. Thallus crustaceus, tenuis, subfuscus. Perithecia minuta, nigra, sparsa, hemispherica, immersa, dimidiata, ostiolo minuto notata; paraphysibus gracilibus, ramosis, confertis; ascis cylindraceis, circa 0·090–100 mm. longis, 0·010 mm. latis; sporis octonis, parallelo-dispositis, filiformibus, obscure multo-septatis, 0·050–80 mm. longis, 0·001–2 mm. latis, rectis vel curvatis.

Ad corticem arborum.

Collected by the late Isaac Carroll at Glenbower, Cork. It is distinguished from allied species by the long slender spores.

Microthelia dispora, sp. n. Thallus cinereo-albidus, furfuraceus, tenuis vel obsoletus. Perithecia minuta, 0·150–200 mm. diam., globosa, nitido-nigra, semi-immersa, vel subsessilia, subintegra; paraphysibus gracilibus, ramosis, confertis; ascis elongato-clavatis, 0·065 mm. longis, 0·015 mm. latis; sporis binis, oblongis, fuscis, majusculis, 1-septatis, 0·025–35 mm. longis, 0·010–12 mm. latis.

Ad saxa calcarea.

Apt to be confused with *Arthopyrenia saxicola*, under which species it had been classified by the late W. Joshua, who collected it at Sapperton, Gloucestershire.

Porina Curnowii, sp. n. Thallus olivaceo-fuscus, tartareus, tenuis, inæqualis, continuus vel rimosus. Perithecia sparsa, minuta, nigra, hemispherica, dimidiata, ad basim immersa, ostiolis minute papillatis, haud prominulis, notata; paraphysibus numerosis, gracilibus; ascis cylindraceo-clavatis, 0·080 mm. longis, 0·007–8 mm. latis; sporis octonis, anguste fusiformibus, 7- vel pluri-septatis, circa 0·052 mm. longis, 0·003 mm. latis.

Ad saxa.

Collected by the late W. Curnow on fragments of rock at Penzance. It differs from *P. lucens*, to which it is closely allied, by the size and form of perithecia and spores.

Description of Plate 510.

1. *Lecidea pleiospora.* Ascus and spores, × 550. 2. *Gongylia viridis.* *a*, perithecium, × 100; *b*, ascus and paraphyses, × 300; *c*, spore, × 550. 3. *Microglæna Larbalestierii.* *a*, ascus; *b*, spores, × 550. 4. *M. Holliana.* *a*, perithecium in section, × 100; *b*, ascus, × 120; *c*, spore, × 550. 5. *Arthopyrenia areniseda.* Ascus and two of the spores, × 550. 6. *A. Crombiei.* *a*, ascus; *b*, spore, × 550. 7. *Leptorhaphis Carrollii.* *a*, ascus; *b*, spore, × 550. 8. *Microthelia dispora.* *a*, ascus and spores, × 550. 9. *Porina Curnowii.* *a*, ascus and paraphyses, *b*, spore, × 550.

THE PIMPERNELS.

By C. E. Moss, B.A., D.Sc.

Mr. F. N. Williams, in the seventh part of his scholarly *Prodromus Floræ Britannicæ* (1910, 427, *et seq.*), gives a highly interesting account of the British forms of the Pimpernel. To the references he gives may be added the records of a blue Pimpernel near Cambridge, by Ray (Cat. 1660, 11), by J. Martyn (Meth. 1727, 71), by Relhan (Flo. Cantab. 1785, 86), and by Babington (Flo. Camb. 1860, 190). Babington states that "most, if not all, those gathered were blue-flowered *A. arvensis*." A blue Pimpernel still occurs in this locality; but it is rare. Hind (Flo. Suff. 1889, 285) may be added to the authorities mentioned by Mr.

Williams who have recorded the occurrence of two blue Pimpernels: "(a) compact in habit, ascending, flowers and leaves rather smaller than those of *A. arvensis*; (b) prostrate in habit, branches straggling, one to two feet in length, leaves and flowers much larger than in *A. arvensis*." The Cambridge plants I have seen agree with the second of the two forms mentioned by Hind; and I have seen plants of his first form in Somerset, growing along with the *Althæa hirsuta* there. Mr. Williams's account of the British Pimpernels is the most detailed that has yet appeared from the systematist's point of view; but recent work by Professor Weiss (Brit. Ass., Sheffield, 1910) shows that the results of the experimental breeder must be taken into account before it is possible to arrive at definite conclusions with regard to the status of the various forms of Pimpernel.

Mr. Williams adds another species of Pimpernel (*Anagallis latifolia* Linn.) to the British flora, though the only definite evidence for regarding this as a British plant is based on dried material. As the various Pimpernels are highly critical forms, it might perhaps be argued that this proposed addition to the British flora is rather premature, especially as some of the characters of the Pimpernels are now being studied in relation to the laws of heredity, and others appear to be of such a nature that they vary somewhat with the season and with the habitat. Until British specimens, admitted by Mr. Williams to conform to his notion of *A. latifolia*, have been studied in the living state, it is perhaps best not to admit the claims of this plant to be a British species.

Mr. Williams throws some doubt on the occurrence in Britain of a blue Pimpernel with gland-tipped petals, such as occur in *A. arvensis* Linn.; in fact, he states (p. 429) that among all the material he has examined in herbaria, and also in cases where he has observed blue-flowered plants either growing wild or in pots, he has "not come across a blue Pimpernel with a fringed corolla." Bromfield (Flo. Vect. 1856, 404), however, recorded such plants more than fifty years ago. Professor Weiss obtained blue, flesh-coloured, pink, and scarlet Pimpernels from Anglesey; and he states (*loc. cit.*) that in all the specimens examined, glandular hairs were present on the margin of the petals. Such a plant, also, is abundant in Northern Algeria, as near Algiers, Oran, and Tlemçen. I examined a large number of these last spring; and in all the cases I observed, the beautiful fringe of gland-tipped hairs was conspicuous. Professor Weiss also examined blue Pimpernels from the Riviera; and this form from the Mediterranean region he thinks (*loc. cit.*) may be a different species. Its petals are gland-fringed, as Professor Weiss (*in litt.*) informs me. If Mr. Williams is correct in believing that there are in Britain two blue Pimpernels, each destitute of a fringed corolla, then Bromfield's record and Professor Weiss's Anglesey plants indicate that there are at least three blue Pimpernels in this country.

Mr. Williams (p. 432) expresses the view that the flesh-coloured Pimpernel (*A. carnea* Schrank) is a hybrid of *A. arvensis* and *A. latifolia*. Continental botanists* usually regard it as a hybrid of *A. arvensis* and *A. femina* (=*A. cœrulea*). However, the researches of Professor Weiss point to its not being a hybrid at all. Professor Weiss artificially crossed the scarlet and the blue Pimpernels; and the resulting hybrids (f_1) were plants not with flesh-coloured but with scarlet corollas. Only in one or two hybrids out of several hundreds was a small blue streak noticeable on the otherwise scarlet petals to indicate the hybrid origin. Professor Weiss then artificially self-pollinated the hybrid Pimpernels; and in the second (f_2) hybrid generation only plants occurred with either scarlet or blue flowers: no intermediate colours were noticeable. This applied to all the offspring obtained by reciprocal crossings of the parent plants. Up to the present, the numbers in the f_2 generation obtained by Professor Weiss are: in descendants of *A. femina* (female) and *A. arvensis* (male), sixty-two scarlet and eight blue; and in descendants of *A. arvensis* (female) and *A. femina* (male), twenty-five scarlet and two blue. Thus the blue is recessive and the scarlet dominant. It is proved therefore that Continental botanists are in error in referring *A. carnea* to the hybrid of *A. arvensis* and *A. femina* (= *A. cœrulea*). It is, of course, open to Mr. Williams to argue that the blue Pimpernel used by Professor Weiss was *A. femina* and not *A. latifolia*, and that it is therefore possible that his own view of the origin of *A. carnea* may be correct. This, however, is not likely to be the case, for not only has Professor Weiss proved the blue colour to be recessive in the offspring of *A. arvensis* and *A. femina*, but he has proved the same rule to hold in other Pimpernels. For example, a pink Pimpernel (for which I know no binomial) was crossed with a blue one; and here again the blue colour proved to be recessive in the f_1 generation. Further, Mr. R. P. Gregory has proved blue to be recessive in the allied genus *Primula*; and work by Miss Wheldale suggests that colour factors of this nature are far more than specific in their significance. Hence, the conclusion is strongly indicated that British botanists have all along been correct in refusing to regard *A. carnea* as a hybrid.

Professor Weiss points out that Gaertner (*Bastardenerzeugung*, 1849) states that the scarlet and blue Pimpernels do not produce fertile seed when crossed; and Professor Weiss informs me (*in litt.*) that, although he has pollinated many blue Pimpernels (with gland-fringed petals) from the Riviera with the British scarlet form, he has not yet succeeded in hybridizing them.

Mendelian workers have proved over and over again that many hybrid products are not intermediate in character between their known parents; and Professor Weiss's hybrid Pimpernels add one more example to this category. It can no longer be accepted that the supposed intermediate character of a plant between two allied ones offers any presumption that the plant in question is a hybrid. Unless experimental evidence of hybridity is forthcoming, some other proof, such, for example, as that based on distribution, must be adduced before any particular plant may be safely regarded as a hybrid. From this point of view, it is a pity that most Mendelian workers prefer to use almost exclusively plants of garden origin, instead of closely allied wild plants which would serve their purpose quite as well.

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* See, for example, Pax & Knuth in Engler's *Das Pflanzenreich*, iv. 237, *Primulaceæ*, pp. 322–5 (1905), where *A. arvensis* L. is subdivided into var. *α phœnicia* (Scop.) Gren. & Godr., var. *β cœrulea* (Schreb.) Gren. & Godr. [=*A. femina* Mill. Gard. Dict. ed. 8, n. 2 (1768)], var. *phœnicia* × *cœrulea* = *A. carnea* Schrank, and var. *γ latifolia* (L.) Lange.

It is now established that the scarlet Pimpernel will hybridize with some blue Pimpernels, that the hybrids of the first generation of these have scarlet flowers (very rarely streaked with blue), and that the latter, when self-pollinated, yield offspring, many with scarlet and a few with blue flowers. In a state of nature, any one of the hybrid products may possibly be fertilized with any other hybrid product or with either of the original parents ; and thus it is obvious that, in any locality where the parental scarlet and blue plants occur, a host of hybrid forms may be produced, some with scarlet and some with blue flowers. Hence, it is quite possible that there are many more than three kinds of blue Pimpernels in the country, and many kinds of scarlet ones which have hitherto eluded observation ; and the kinds of wild Pimpernels may ultimately prove to be as numerous as the cultivated races of, say, the Sweet Pea.

Professor Weiss is now carrying on experiments with a view to settle the systematic position of *A. carnea*. At present this botanist is inclined to regard *A. carnea*, in which he notes some variation in colour, as "a pale variety of the scarlet Pimpernel" ; and this has been the view of British systematists generally.

It is frequently stated that one of the blue Pimpernels and one of the flesh-coloured Pimpernels are erect. However, all the plants I have seen of these are more or less prostrate at maturity, though younger plants are often suberect or ascending ; and possibly this is the case with *A. latifolia*, which Mr. Williams states is also erect. Nor have I ever seen a Pimpernel with truly amplexicaul leaves, though one form of the blue and one form of the flesh-coloured Pimpernels have, when growing in rich garden soil, large leaves, partially overlapping at the base.

It cannot be denied that the established results of recent work on hybridization will render the future work of the systematist more complicated, although, at the same time, the relationships of closely allied forms will become much better known and appreciated. In so far as this work tends to drive the systematist from work exclusively in the herbarium into the open field or into the experimental garden, the ultimate effect will be highly salutary to the science of botany as a whole.

LEICESTERSHIRE PLANTS (1905–1910).

By A. R. Horwood.

(Concluded from p. 36.)

Vicia tetrasperma Moench. Aylestone, Swithland Wood, *L. S. B.* —**V. Cracca* L. b. *villosa* (Roth). Belgrave, *W. B.* (W. B. E. C. 1910). — *V. angustifolia* L. Aylestone, *L. S. B.* Cranhoe.— b. *Bobartii* Koch. Cropston, Beacon Hill.

Lathyrus montanus Bernh. In pastures about Claxton and Goadby, *I. E.*

Prunus spinosa L. b. *macrocarpa* Wallr. Quorn, *F. L. F. K.* (B. E. C. R. 1907) (W. B. E. C. 1907, 1908). This is, according to Rev. A. Ley, *P. macrocarpa* Wallr. (W. B. E. C. 1907); and Mr. C. E. Salmon says it agrees with the description of *P. fruticans* Weihe in Townsend's *Flora of Hants*, ed. ii. p. 630. In B. E. C. R. 1907, the same plant apparently is referred by the Revs. E. F. Linton and H. J. Riddelsdell to *P. insititia*. Mr. D. Fry and J. W. White agree to this; and this opinion is noted in contributing the plant again under the name *P. domestica* in W. B. E. C. 1908.

P. avium L. Scraptoft, Baggrave, King's Norton, Hallaton.

P. Cerasus L. Blaston.

†*P. Padus* L. Belvoir, *I. E.* Scraptoft, Gracedieu. Birstall, *G. M.*

Spiræa Filipendula L. Castle Donington (N. H. T.). Scraptoft, Tilton Hill, Saltby.

Rubus idæus L. Seal Wood (N. H. T.).

R. Lindleianus Lees. Croft.

R. pulcherrimus Neum. Burbage Wood. Swithland Wood, *W. B.* (W. B. E. C. 1905).

R. thyrsoideus Wimm. Moira (N. H. T.).

R. salteri Bab. Moira (N. H. T.).

R. leucostachys Sm. Croft.

R. echinatus Lindl. Theddingworth. Barkby Holt.

R. rudis Wh. & N. Oadby Oaks (W. B. E. C. 1905). Knighton Spinney (W. B. E. C. 1905). Of these, the Rev. W. Moyle Rogers remarks that the leaves are remarkably roundish.

R. oigoclados Muell. & Lefv. c. *bloxamianus* (Colem.). Newtown Linford, *W. B.* (W. B. E. C. 1905). Cropstone, *L. S. B.* Burbage Wood.

R. fuscus Wh. & N. Woodville (N. H. T.).

R. rosaceus Wh. & N. e. *infecundus* Rogers. Highway Spinneys, Braunstone, *W. B.* (B. E. C. R. 1908).

R. dasyphyllus Rogers. Burbage, Blaston, Croxton Park. Barkby Holt.

R. dumetorum Wh. & N. a. *ferox* Weihe. Stoughton, *W. B.* (B. E. C. R. 1908). — e. *rubriflorus* Purchas. Croxton Kerrial.— h. *raduliformis* Ley. In several parts of the county, *W. B.*

R. Balfourianus Blox. Blaston.

Geum rivale L. Seal Wood, Grange Wood (N. H. T.). Shawell Wood.

Potentilla argentea L. c. *tenuiloba* (Jord.). Groby Pool, *W. B.* (W. B. E. C. 1908).

Alchemilla vulgaris (L.) c. *filicaulis* (Buser). Scraptoft, Ingarsby Tunnel, Tilton Hill. Cropstone, *L. S. B.*

Rosa mollis Sm. Burbage Wood.

R. omissa Déségl. Braunstone, *W. B.* (B. E. C. R. 1908).

R. cuspidatoides Crépin. Shoulder-of-Mutton Hill, *W. B.* (W. B. E. C. 1907).

R. micrantha Sm. Breedon Cloud Wood, Packington (N. H. T.). Quorn, *W. B.*, *F. L. F. K.* (W. B. E. C. 1907).

R. agrestis Savi, d. *inodora* Hook. fil. Donisthorpe (N. H. T.).

R. Borreri Woods f. *arvatica* (Baker). Stoughton, South Croxton. Eleven Shillings, Knighton, *W. B.* (B. E. C. R. 1906).

R. canina L. a. *lutetiana* (Léman). Blaby, *W. A. V.* (W. B. E. C. 1907).

R. canina L. var. *lutetiana* (Léman) var. *fallens*. Petiole hairy, leaflets broad, fruit obovoid, South Croxton (W. B. E. C. 1907) (B. E. C. R. 1907), or *R. touranginiana* Déségl. & Rip.

R. dumalis (Bechst.) var. *cladoleia* Rip., with hairy styles. Great Stretton, *C. B. H.* (W. B. E. C. 1907). — Var. *erythrella* Rip., with woolly styles. Regent Road, *L. M. Bell* (W. B. E. C. 1907).—Var. *insignis* Déségl., with subglabrous style. Lowesby (W. B. E. C. 1907). — Var. *eriostyla* (Rip. & Déségl.), biserrate, woolly style. Blaby, *W. A. V.* (W. B. E. C. 1907). — *verticillacantha* (Mérat), fruit globose, stalked glands, nearly orbicular leaflets, Bull-in-the-Oak Lane, *W. B.* Braunstone, *W. B.* (B. E. C. R. 1906).

R. dumetorum Thuill. d. *urbica* (Léman). Lowesby, but with thinly hairy styles, South Croxton (W. B. E. C. 1908). — b. *semiglabra* (Rip.), hairy on midrib only, Battenberg Avenue, *W. B.* (W. B. E. C. 1907). — j. *collina* (Jacq.). Stoughton (W. B. E. C. 1907).—Var. *amblyphylla* Rip. Biserrate, glabrous leaves and styles. Blaby, *W. A. V.* (W. B. E. C. 1907). — *coriifolia* Fr. var. *cinerea* Rip., peduncle and petioles glandular, fruit hispid. Ingarsby (B. E. C. R. 1907).

R. arvensis Huds. Leaflets more acuminate. Quenby (B. E. C. R. 1908).

Pyrus scandica Aschers. Quorn. — *P. aucuparia* Gaertn. Baggrave.

Cratægus Oxyacantha L. Baggrave, Scraptoft.— *C. monogyna* Jacq. *b. *laciniata* Wallr. Scraptoft. — *C. kyrtostyla* (Fingerh.). Scraptoft (W. B. E. C. 1906). — *C. monogyna* × *C. oxyacantha*. Scraptoft (*ibid.*).

Saxifraga tridactylites L. Medbourne, Great Easton.—*S. granulata* L. Belvoir, *I. E.*

Chrysosplenium oppositifolium L. Launde, Gracedieu.

Parnassia palustris L. Botcheston Bog.

†*Ribes Grossularia* L. Ratcliffe, Baggrave, Hallaton, North Kilworth. — *R. rubrum* L. Belvoir, *I. E.* Hungarton. Narborough, *L. S. B.*

Sedum album L. The Brand, Botcheston.—*†*S. dasyphyllum*

L. Between Waltham and Scalford, *H. P. R.*—†*S. reflexum* L. Stathern, Stonesby, Hallaton.

†*Sempervivum tectorum* L. Evington, Barsby, Botcheston, Welham. Blaby, *W. A. V.* (W. B. E. C. 1907).

Myriophyllum spicatum L. Ratcliffe.

Callitriche stagnalis Scop. Styles ultimately reflexed impersistent (W. B. E. C. 1906). Sawley Bridge, *T. E. R.* Elmesthorpe (W. B. E. C. 1908). Twycross (N. H. T.). Belgrave, Hallaton, Stoaton Wyville, Burbage Wood.—*C. intermedia* Hoffm. Blaston.

Lythrum Salicaria L. East Langton, Birstall, Syston.

Epilobium angustifolium L. Marefield, Thurnby, Croft, Stony Stanton, Laughton Hill, Glooston.—*E. roseum* Schreb. Botcheston Bog, Market Harborough.—**E. obscurum* Schreb. × *parviflorum*. Syston. Blaby, *W. A. V.*—*E. palustre* L. Moira Reservoir (N. H. T.). Billesdon, Quenby, Foxton.

*†*Œnothera biennis* L. Naturalized on railway slopes at Leicester (N. H. T.). Humberstone, *A. R. H.* Birstall, *G. M.*

Circæa lutetiana L. Launde.

Hydrocotyle vulgaris L. Desford, Narborough Bog.

Sanicula europæa L. Scraptoft, Lowesby Hill, Launde, Shawell Wood. Wistow, *T. R. G.*

Apium nodiflorum Reichb. fil. b. *ochreatum* DC. Scraptoft, Billesdon Coplow, S. Croxton.

*†*Carum Petroselinum* Benth. & Hook. fil. Laughton Hill, *H. P. R.* Aylestone, *L. S. B.*—*C. segetum* Benth. & Hook. fil. Stathern.

Sison Amomum L. Ragdale, Stathern, very rare east of the R. Soar. Ashby-de-la-Zouch (N. H. T.).

Pimpinella major Huds. b. **dissecta* N. E. Br. Leicester, *A. R. H.* (W. B. E. C. 1906). More pubescent than usual, according to the Rev. E. F. Linton.—*P. Saxifraga* L. var. *dissecta* With. Quorn, *F. L. F. K.* (W. B. E. C. 1907). Crown Hills, Glooston.

Scandix Pecten-veneris L. Humberstone, Barkbythorpe, Houghton, Elmesthorpe. Birstall, *G. M.*

Anthriscus vulgaris Bernh. Kirby Muxloe Castle Ruins, Great Easton.

Œnanthe aquatica Poir. Saddington Reservoir (W. B. E. C. 1907).—*Œ. fluviatilis* Colem. Aylestone (W. B. E. C. 1907).

*†*Coriandrum sativum* L. New Humberstone, *A. R. H.* Aylestone, *L. S. B.* Ragdale, *H. P. R.* Birstall, *G. M.*

Heracleum Sphondylium L. var. *angustifolium* Huds. Aylestone (W. B. E. C. 1906). Hallaton.

Caucalis daucoides L. Evington, *J. B.*—*C. nodosa* Scop. Crown Hills, Lowesby, Hungarton, Saltby, Neville Holt, Blaston. Goadby Marwood. Thornton, *L. S. B.* Birstall, *G. M.*

Hedera Helix L. A narrow-leaved form occurs here and there as at Bruntingthorpe, Cotesbach, &c.

Adoxa Moschatellina L. Marefield, Thornton Reservoir, Launde. Desford, *L. S. B.*

Sambucus Ebulus L. Stockerston, *H. P. R.*

Viburnum Opulus L. (W. B. E. C. 1906.) A curious yellowfruited form grows, or used to grow, at Narborough Bogs, but during recent deforestation has been cut down—another local instance of extinction. It was the only station known in Leicestershire. The fruit differed somewhat in shape from the type, and was always a citron-yellow. The Rev. E. F. Linton says he has it from Ednaston, Derbyshire.

†*Lonicera Caprifolium* L. Withcote, *E. Gamble.*

Galium erectum Huds. Knighton, *W. B.* — *G. Mollugo* L. Breedon Village (N. H. T.). South Croxton, East Norton, Hallaton, Glooston, Cranhoe, Church Langton.—*G. palustre* L. b. *elongatum* (Presl.). Aylestone, Coleman Road. — *G. uliginosum* L. Blackbrook (N. H. T.). — *G. tricorne* Stokes. Near Billesdon Coplow.

Asperula odorata L. Launde, Blaston.

Kentranthus ruber DC. Between Edmonthorpe and Wymondham, *R. Barnes.*

Valeriana dioica L. Marefield, Ingarsby. — *V. officinalis* L. (= *V. Mikanii* Syme). Lowesby.—*V. sambucifolia* Mikan. Swithland Wood, *L. S. B.* Cropstone.

Valerianella olitoria Poll. Narborough, *Dr. M. Gunning.*

*†*Dipsacus fullonum* L. Aylestone, *L. S. B.* Birstall, *G. M.*

Eupatorium cannabinum L. Moira (N. H. T.).

Solidago Virgaurea L. Between Moira and Gresley (N. H. T.).

Erigeron acre L. Worthington, Croft.

Bellis perennis L. A curious dwarf form occurs on Burbage Common.

Filago germanica L. Buddon Wood, *A. Cox.* Billesdon Coplow, Branston, Saltby, Goadby Marwood.

Bidens tripartita L. Croft.

Achillea Ptarmica L. In and about Goadby and Eastwell, *I. E.* Billesdon Coplow, Cold Newton. Swithland Woods, *L. S. B.* Burbage.

Anthemis arvensis L. Branston.

†*Chrysanthemum segetum* L. Syston, Billesdon Coplow, New Humberstone, Branston, Stathern, Saltby. Mountsorrel, *T. R. G.* Forest West, *L. S. B.* Birstall, *G. M.* Evington, *J. B.*

†*Matricaria suaveolens* Buchenau. Syston (W. B. E. C. 1906). Kirby Muxloe.

Tanacetum vulgare L. Glenfield, *A. B. Jackson.* Hills about Barkston, Harby, *I. E.*

Artemisia Absinthium L. New Humberstone, Aylestone, *L. S. B.* Birstall, *G. M.* — *A. vulgaris* L. Syston, Stathern. — †*A. pontica* Wallr. Cropston, *F. L. F. K.* (W. B. E. C. 1909).

Petasites ovatus (= *vulgaris*) Hill. Keyham, Ingarsby, Gracedieu, Brooksby, Coston, Foston.

Senecio vulgaris L. var. **lanuginosus*. Burbage, *A. R. H.*—*S. sylvaticus* L. Ratcliffe to Six Hills, Laughton Hill.—*S. viscosus* L. Ellistown, Bardon Hill. Medbourne. Aylestone, *L. S. B.*

Arctium nemorosum Lej. Swithland Woods, *L. S. B.*—Var. *subtomentosum* Ar. Benn. East Langton, *F. Brown* (W. B. E. C. 1908).

Carduus nutans L. Lowesby, Billesdon Coplow, Croft, Stathern.

Cnicus eriophorus Roth. Breedon Cloud Wood (N. H. T.), about Belvoir, and all the way to Stathern, *I. E.* King's Norton, Marefield, Ragdale, near Saltby. Shovel Nook, Knighton, *W. B.* (W. B. E. C. 1910).—*C. pratensis* Willd. Elmesthorpe, *H. P. R.* —*C. acaulis* Willd. Whittle Hills (N. H. T.). Croxton Kerrial, on way to Skillington, *I. E.* Common in District 2, as at Scraptoft, Lowesby, Houghton, Glooston, and elsewhere.—*C. arvensis* Hoffm. b. **vestitus* (Koch). Well Street, Leicester (B. E. C. R. 1906), *H. P. R.* — *C. mitis* Koch. New Humberstone, Hastings Street.

Onopordon Acanthium L. Breedon Quarries (N. H. T.). Foxton, *H. P. R.*

†*Silybum Marianum* Gaertn. Ratby, Botcheston.

Serratula tinctoria L. Moira Reservoir (N. H. T.). Stathern, Harby Pastures, *I. E.* Keyham, Lowesby, Billesdon Coplow, Burbage.

Centaurea Scabiosa L. Ticknall (N. H. T.). Billesdon Coplow, Ratcliffe to Six Hills, Saltby.—†*C. Cyanus* L. In a field between Moira and Gresley (N. H. T.). Aylestone, Ragdale.

Cichorium Intybus L. Syston. Evington, *J. B.* Humberstone Road.

Picris hieracioides L. South Croxton, Kirby Muxloe.—*P. echioides* L. Bottesford, *I. E.*

Crepis taraxacifolia Thuill. Elmesthorpe, Glen Parva. Birstall, *G. M.*

Hieracium aurantiacum L. Kibworth, *Miss M. E. Whitton.*

H. acroleucum Stenstr. var. *mutabile* Ley. Mountsorrel Quarries *F. L. F. K.* (B. E. C. R. 1906) (W. B. E. C. 1908).

H. pinnatifidum Lönnr. West Bridge, *W. B.* (W. B. E. C. 1907).

H. sciaphilum Uechtr. Cropstone; ligules strongly pilose-tipped, *C. B. H.* (W. B. E. C. 1908).

H. cacuminatum Dahlst. Swithland, *C. B. H.* (W. B. E. C. 1908).

H. rigidum Hartm. f. *lineatum* Dahlst. With heads glabrous, Hallgates (W. B. E. C. 1906).

H. sabaudum L. b. *boreale* (Fr.). Cropstone, *L. S. B.*—c. *rigens* (Jord.). With leaves subsimilar. Hallgates, *W. B.* (W. B. E. C. 1906). — d. *hervieri* Arv.-Touq. With green pubescent heads. Cropstone, *F. L. F. K.* (W. B. E. C. 1909).

H. umbellatum L. f. *coronopifolium* Fr. Hallgates, *W. B.* (W. B. E. C. 1906).

Taraxacum erythrospermum Andrz. Hallaton.—*T. palustre* DC. Stoughton.

Lactuca muralis Gaertn. Sanvey Castle. Castle Donington, *L. P. S.*

Tragopogon pratense L. b. *Symei* Ar. Benn. Scraptoft (W. B. E. C. 1909). The Rev. E. S. Marshall says this is synonymous with *T. pratensis* var. *grandiflorus* Syme.

Jasione montana L. Mountsorrel, *T. R. G.*

Campanula glomerata L. Tilton Hill, Saltby.—*C. Trachelium* L. Blaston.—*C. latifolium* L. Baggrave.

Legousia hybrida Delarbre. Saltby, Breedon.

Lysimachia vulgaris L. At Ashby near the Old Parks (N. H. T.). Rothley.—*L. Nummularia* L. Grange and Seal Woods (N. H. T.).

Anagallis fœmina Mill. Holy Cross Priory Garden. Belgrave, *G. M.* Aylestone, *L. S. B.*

*†*Vinca major* L. Woolsthorpe, *I. E.* Sanvey Castle.—*V. minor* L. Easton, *I. E.* Birstall Spinney, *C. Musson.* Belgrave, *G. M.* Ratcliffe, Gaulby.

Centaurium umbellatum Gilib. Grange Wood (N. H. T.). Thurmaston, Burbage. Mountsorrel, *E. E. L.*

Gentiana Amarella L. Saltby.

Menyanthes trifoliata L. Botcheston Bog.

Polemonium cœruleum L. Between Walton and South Kilworth, *A. R. H.*, 1909.

†*Symphytum officinale* L. By the Devon, Muston, *I. E.* Aylestone, *L. S. B.* Hallaton.

†*Borago officinalis* L. Kilworth, *Miss M. E. Whitton.* Aylestone, *L. S. B.*

*†*Anchusa sempervirens* L. Wanlip, *H. P. R.*

Lycopsis arvensis L. Rothley, Lutterworth.

Pulmonaria officinalis L. Birstall, *C. Musson.*

Myosotis cespitosa Schultz. Welham.—*M. sylvatica* Hoffm. Baggrave, Allexton, Blaston, Medbourne, Hallaton.—*M. arvensis* Hill b. *umbrosa.* East Norton.—*M. collina* Hoffm. Syston.—*M. versicolor* Sm. Seal Wood (N. H. T.). Syston, Newtown Unthank, Launde. Between Thurcaston and Cropston, *L. S. B.* Birstall, *G. M.*

Lithospermum officinale L. Evington, *J. B.*—*L. arvense* L. Near Norris Hill (N. H. T.). Aylestone.

Echium vulgare L. Ashby Pastures, Owston Wood, Branston.

†*Amsinckia lycopsioides* Lehm. Aylestone. Evington, *J. B.*

Calystegia sepium Br. fl. *rosea.* Groby.

Solanum nigrum L. New Humberstone.

†*Lycium chinense* Mill. Scraptoft, Croft.

Atropa Belladonna L. Between Saxby and Wymondham, *R. Barnes.*

Hyoscyamus niger L. New Humberstone. Rearsby, *E. F. C.*

†*Linaria Cymbalaria* Mill. Wanlip, Stathern, Arnesby.—*L. purpurea* Mill. Railway embankment, Regent Road, New Humberstone.—**L. repens* Mill. Long Clawson, *H. P. R.*—*L. minor* Desf. Ibstock, Ratby.

Scrophularia nodosa L. South Croxton.

†*Mimulus Langsdorfii* Donn. Swithland Reservoir, *O. Murray Dixon.* Botcheston Bog. Quorn, *A. Cox.*

Veronica montana L. Groby Pool.—*V. scutellata* L. Cropston, Great Easton.

Euphrasia Rostkoviana Hayne. Hairy and glandular. Swithland, *W. B.* (W. B. E. C. 1908).

E. borealis Towns. With broader, less acute teeth, calyx-teeth equalling capsule. Ingarsby (W. B. E. C. 1906).

E. stricta Host. Ingarsby, bracts with acute awned teeth, with calyx-teeth exceeding capsule (W. B. E. C. 1906).

E. nemorosa H. Mart. Saltway, *C. B. H.* (W. B. E. C. 1905, 1907), but with teeth exceeding calyx and capsule. Saltby, Woodhouse Eaves. Botcheston, *L. S. B.*

E. curta Wettst. b. *glabrescens* Wettst. Beacon Hill.

Bartsia Odontites Huds. b. *serotina* (Dum.). South Croxton (B. E. C. R. 1905). Saltby.

Pedicularis palustris L. Groby Pool, Botcheston Bog.—*P. sylvatica* L. Lowesby.

Melampyrum pratense L. Swithland Wood.

Utricularia vulgaris L. Donington Park (N. H. T.).

Mentha arvensis L. Branston, Arnesby.

Lycopus europæus L. Foxton. Great Glenn, *T. R. G.*

Thymus Chamædrys Fr. Sanvey Castle, Laughton Hill, Thurnby.

Calamintha Acinos Clairv. Branston.

†*Melissa officinalis* L. Near Smoile (N. H. T.). Aylestone, *L. S. B.*

Salvia Verbenaca L. Kegworth Churchyard, *Mr. Caley* (Withering, vol. ii. p. 20). Hungarton.

Nepeta Cataria L. Netherseal (N. H. T.).

Scutellaria minor L. Groby (N. H. T.).

Prunella vulgaris L. White-flowered forms have occurred at South Croxton and Scraptoft.

Marrubium vulgare. Burbage Common. Aylestone, *L. S. B.*

Stachys (*ambigua* Sm.) *palustris* × *sylvatica.* Aylestone, *T. R. G.*—*S. palustris* L. Foxton.

†*Leonurus Cardiaca* L. Weed in Holy Cross Priory garden.

Lamium amplexicaule L. Lowesby Station, Great Easton. Belgrave, *G. M.*—*L. hybridum* Vill. Lutterworth, Shawell Wood. —*†*L. maculatum* L. Knighton, Swithland.—*L. Galeobdolon* Crantz. Blaston, Cotesbach.

Scleranthus annuus L. Queniborough.

Plantago major L. b. *intermedia* (Gilib.). Billesdon Coplow (W. B. E. C. 1906).—*P. lanceolata* L. b. *Timbali* Reichb. fil. Beacon Hill, Queniborough. According to the Rev. E. F. Linton, between type and the variety, not identical in heads or leaves with South of France plants (W. B. E. C. 1906).

Chenopodium polyspermum L. Humberstone Asylum grounds, *Dr. Finch.* Swithland.—Var. b. *cymosum* Moq. Evington, *W. B.* (B. E. C. R. 1906).—*C. Vulvaria* L. Syston, *R. Barnes.*—*C. album* L. b. *viride* (L.). New Humberstone (W. B. E. C. 1908). Aylestone (W. B. E. C. 1907).—*C. paganum* (Reichb.). Humberstone, Aylestone. Intermediates between it and type (W. B. E. C. 1907).—*C. serotinum* L. (= *ficifolium* Sm.). New Humberstone (W. B. E. C. 1907).—*C. murale* L. Belgrave, *G. M.*—†*C. Bonus-Henricus* L. Shawell Wood, Market Harborough, Hallaton, Quorn, Hungarton, South Croxton.

Polygonum aviculare L. a. *agrestinum* (Jord.). South Croxton. —c. *arenastrum* (Bor.). Battenberg Avenue, *W. B.* So named by C. E. Salmon (W. B. E. C. 1907). Barrow-on-Soar, *F. L. F. K.* (W. B. E. C. 1909). Suggested to be var. *microspermum* (Jord.), but, as noted by Mr. C. E. Salmon, not possessing included fruit.—e. *rurivagum* (Jord.). Mountsorrel, *F. L. F. K.* (W. B. E. C. 1909).—*P. Persicaria* L. fl. *alba*. Saltby.— b. *elatum* Gren. & Godr. Belgrave.

†*Fagopyron sagittatum* Gilib. (= *esculentum* Moench). Elmesthorpe, Evington.

Rumex maritimus L. Cropston, Klondyke, Swithland. —*R. crispus* L. × *R. obtusifolius* (= *acutus* L.). Ashby (N. H. T.).—*R. Hydrolapathum* Huds. Foxton. —*R. Acetosella* L. Hoby, Lutterworth. Ashby Parva, Aylestone, *L. S. B.* Birstall, *G. M.*

Daphne Laureola L. Hungarton, near Great Bowden Inn; Market Harborough, and Leicester Road, Hallaton.

Mercurialis annua L. Freemen's Common, *J. E. Jordan* (see also B. E. C. R. 1910).

Ulmus campestris L. c. *glabra* (Mill.). Baggrave (W. B. E. C. 1907; B. E. C. R. 1908). Evington, Thurnby, Ingarsby, Ratcliffe, Launde, Blaston. I do not accept Mr. Ley's reference of the first to *Ulmus suberosa* Ehrh.; more probably it is *Ulmus major* Sm. The bole is not inconspicuous, the bark of shoots is not suberous, and there are no suckers. *U. suberosa*, quite different, grows in the same place.

**Cannabis sativa* L. Elmesthorpe (B. E. C. R. 1905). Billesdon, Groby.

Parietaria ramiflora Moench. Branston.

Carpinus Betulus L. Stoughton, Medbourne. Quorn, *C. Adams.*

Quercus robur L. b. *intermedia* (D. Don). Stoughton (W. B. E. C. 1908). Dr. C. E. Moss calls this *Quercus robur* × *sessiliflora*. Quenby.—*C. sessiliflora* (Salisb.). Billesdon Coplow.

Salix pentandra L. Near Little Stretton.

S. fragilis L. form. Quenby.

S. alba L. × *fragilis* (*viridis* Fr.). Desford.

S. undulata Ehrh. Form with small catkins and leaves. Hoby, *W. B.* (W. B. E. C. 1909).

S. purpurea L. Glen Parva. A form with narrow leaves (B. E. C. R. 1906), *F. L. F. K.* Moira (N. H. T.). Glooston.

S. viminalis L. Sanvey Castle, Blaston, King's Norton, Aylestone, Saddington, Thornton.

S. acuminata Sm. Charnwood Forest, *Babington.*

S. caprea L. × *viminalis* (*sericans* Tausch.). South Croxton, King's Norton.

S. cinerea L. f. *aquatica* (Sm.). Woodlands, Knighton, *W. B.* (W. B. E. C. 1907). The Rev. E. S. Marshall suggests var. *oleifolia* Leefe.

S. viminalis (*Smithiana* Willd.). Woodville (N. H. T.). Humberstone, Gwendolen Road, South Croxton, Scraptoft, Blaston, Cranhoe.

S. repens L. f. *parvifolia* (Sm.). Bardon Hill, *C. B. H.* (W. B. E. C. 1907). Of the type, Pulteney (as recorded in Withering, vol. ii. 1801, p. 52) found it in "boggy parts of Charley Forest."

†*Populus alba* × *tremula* (=*canescens* Sm.). Gaddesby Stoughton, Six Hills, Blaston, Woodhouse Eaves, Arnesby. — *P. tremula* L. Cranhoe.—b. *villosa* (Lange). Buddon Wood, Hallaton.—*P. nigra* L. Spinney Hill Park. Most of the so-called *P. nigra* appears to be *P. monilifera*.

Hydrocharis Morsus-ranæ L. Pond at Thurcaston, *G. M.*, where also *Ranunculus Lingua* is a conspicuous denizen, and a rare hepatic, *Ricciocarpus natans* and var. *terrestris*, grows. This pond was well known to the late Rev. T. A. Preston, rector of the parish and the most ardent botanist Leicestershire has possessed. He certainly must have visited it yearly, and perhaps more frequently, so that it is inconceivable that he should have missed it, as likewise must the writer have done. Its discovery is due to the acumen of a youthful botanist of promise, who has discovered many another "good thing" during the past summer. Owing to the extraordinary development of hibernacula the plant does not flower, and it may be from this reason that it has been overlooked. It is the most important discovery of late years in this county, for the only other records are those of Pulteney, going back one hundred and fifty years, and he merely records it "in ditches communicating with the R. Soar." Its subsequent introduction by Mr. J. F. Hollings to a pond at Aylestone is of no botanical interest.

Listera ovata L. Hollinghall Wood, near Loughborough, Buddon Wood, Stocking Wood, near Leicester, *Pulteney* (Withering, vol. ii. p. 35). Ratcliffe, Stoughton, Allexton, Botcheston.

Helleborine latifolia Druce. Seal Wood, Willesley (N. H. T.), near Belvoir Castle, *I. E.*, Burbage Wood.

Orchis pyramidalis L. About Stocking Wood, *Pulteney* (Withering, vol. ii. p. 22). — *O. mascula* L. Ashby Pastures, South Croxton, Shawell.—*O. incarnata* L. Narborough Bog, King's Norton.

Ophrys apifera Huds. Stony Stanton, *F. Brown*.

Habenaria conopsea Benth. Botcheston Bog.

**Iris Pseudacorus* L. b. *acoriformis* (Bor.). Burbage, R. Welland, Medbourne. This appears to be here the dominant form.

Allium vineale L. Botcheston.—b. *bulbiferum* Syme. Soper Bridge, *Rev. M. Holland*.

†*Ornithogalum umbellatum* L. Kirby Muxloe Castle Ruins, Birstall Churchyard.

Lilium Martagon L. Plantations, Cotesbach.

Gagea lutea Gawler. Breedon (Journ. Bot. 1909, p. 31).

Juncus squarrosus L. Whitwick (N. H. T.). Cropstone Reservoir, Beacon Hill.— *J. compressus* Jacq. Muston, Bottesford, *I. E.* Cropstone. Castle Donington, *W. B.* (B. E. C. R. 1908).

Luzula sylvatica Gaud. (=*maxima*). Grange Wood (N. H. T.). —*L. multiflora* DC. (*erecta* Desv.). Seal Wood (N. H. T.).—Var. *congesta* (Lej.). Seal Wood (N. H. T.).

Typha angustifolia L. Foxton.

Sparganium simplex Huds. Moira Reservoir (N. H. T.). Birstall, *G. M.* Foxton.

Arum maculatum L. Said not to be found in District 10, but recently found there in two spots by Father Reader in company with the writer, a quarter of a mile apart, at Cotesbach, April, 1910.

Lemna trisulca L. Ponds at Eastwell, *I. E.* Foxton.

Potamogeton polygonifolius Pourr. Moira (N. H. T.). — *P. heterophyllus* Schreb. Netherseal (N. H. T.). — *P. lucens* L. b. *acuminatus* Fr. Saddington, Foxton.—*P. crispus* L. × *perfoliatus* (*Cooperi*) Fryer. Quorn, *F. L. F. K.* (B. E. C. R. 1907).—*P. zosterifolius* Schum. Canal, Market Harborough. — Var. **major* ined. Aylestone, Foxton. Not known from any other locality in Britain, I believe.

Scirpus fluitans L. Charley Forest (Withering, vol. ii. p. 74). —*S. setaceus* L. Bogs about Woodhouse and in Charley Forest, *Pulteney* (Withering, vol. ii. p. 76). Moira (N. H. T.). — *S. compressus* Pers. King's Norton, Sept. 1909, *A. R. H.*

Eriophorum vaginatum L. Botcheston Bog. — *E. angustifolium* Roth. Botcheston Bog.

Carex pulicaris L. Botcheston Bog.

C. disticha Huds. Scraptoft.

C. paniculata L. Tilton, North Kilworth.

C. divulsa Stokes. Overseal (N. H. T.).

C. echinata Murr. Whitwick, Moira (N. H. T.).

C. Lachenalii Schkuhr. Newtown Unthank, Aylestone, Launde.

C. elata All. (*stricta* Good.). Grange Wood (N. H. T.).—b. *turfosa* (Fr.). Aylestone, *W. B.* (W. B. E. C. 1909). Mr. Arthur Bennett cites as a synonym *C. elata* All. var. *fallax* = *C. Hudsonii* Ar. Benn. var. *fallax.*

C. gracilis Curt. Botcheston, Groby Pool, *W. B.* (B. E. C. R. 1906).—b. *prolixa* (Fr.). Groby Pool (W. B. E. C. 1906). A form near this.

C. pilulifera L. Seal Wood (N. H. T.). Gracedieu.

C. verna Chaix. (*caryophyllea* Latour). Tilton, South Croxton Shawell Wood.

C. pallescens L. Grange Wood (N. H. T.). Launde.

C. panicea L. Scraptoft, Hungarton, Lowesby, Groby, Botcheston.

C. sylvatica Huds. In Stathern Wood, *I. E.* Allexton, Launde, Blaston.

C. fulva Host. Botcheston Bog.

C. flava L. Botcheston Bog.

C. hirta L. var. *hirtiformis.* Cropstone Reservoir.

C. Pseudocyperus L. Burbage Wood, Foxton.

C. vesicaria L. Seal Wood (N. H. T.). Botcheston Bog, Newtown Unthank, Saddington Reservoir.

*†*Panicum sanguinale* L. Humberstone, 1906, *M. Browne.*— *P. miliaceum* L. This plant appeared for several years previous to 1906 at Rawdykes, *W. B.* (B. E. C. R. 1908).

†*Phalaris canariensis* L. North Evington, Aylestone, Queni-

borough, Belgrave. Sewage Works, *W. B.* (B. E. C. R. 1906). Glumes narrow and panicle cylindric but entire.

Alopecurus myosuroides Huds. North Kilworth, Elmesthorpe, Old Humberstone, Syston.—*A. geniculatus* L. × *pratensis* (*hybridus* Wimm.). Belgrave.

Phleum pratense L. b. *nodosum* (L.). Coleman Road, Aylestone, Lowesby (W. B. E. C. 1906, 1907). Sanvey Castle. — d. *stoloniferum* Bab. Coleman Road, Lowesby (B. E. C. R. 1906).

Agrostis canina L. Coleman Road, Ingarsby. — *A. alba* L. b. **stolonifera* (L.). South Croxton.—Var. *prorepens* Koch. South Knighton, *W. B.* (B. E. C. R. 1908); so named by Prof. Hackel.—*A. tenuis* Sibth. var. *pumila* (L.). Not a true variety, but a diseased and fungoid condition. Swithland, Bardon (B. E. C. R. 1907), *W. B.* When tested by the late Rev. W. R. Linton by cultivation it reverted to the type. — *A. nigra* With. Coleman Road, Aylestone, Humberstone.

Calamagrostis epigeios Roth. Grange and Seal Woods (N. H. T.).—*C. canescens* Druce (= *C. lanceolata* Roth). Grange Wood (N. H. T.).

Aira caryophyllea L. Beacon Hill. Swithland, *T. R. G.*—*A. præcox* L. Hoby.

Deschampsia flexuosa Trin. Whitwick, Seal Wood (N. H. T.). Windmill Hill, Woodhouse Eaves.

Avena pubescens Huds. Ashby (N. H. T.). Launde—*A. pratensis* L. Tilton Hill.

Sieglingia decumbens Bernh. Billesdon Coplow, near Thurnby Station.

Kœleria gracilis Pers. Tilton Hill (B. E. C. R. 1905, 1906; W. B. E. C. 1909). South Croxton.—Var. *typica* Dom. Stoughton Road, *W. B.* (W. B. E. C. 1909). Groby, *W. B.* (B. E. C. R. 1907).

Catabrosa aquatica Beauv. Scraptoft, Keyham, R. Swift. Gilmorton.

Melica nutans L. (= *uniflora* Retz.). Grange Wood (N. H. T.). Sheet Hedges Wood, Botcheston.

Poa nemoralis L. Whitwick (N. H. T.). Scraptoft, Kirby Muxloe, Woodhouse Eaves, Launde, Newtown Unthank. —Var. *angustifolia* (Parn.). Wood Lane, Quorn, *W. B.* (W. B. E. C. 1909).—*P. compressa* L. Shepshed, Gracedieu (N. H. T.). Sproxton.—*P. pratensis* L. b. *subcœrulea* (Sm.). Beacon Hill, Windmill Hill. Groby Pool, *L. S. B.* —Var. *angustifolia* (L.). Aylestone, Hallaton, East Langton.

Glyceria fluitans Br. × *plicata* (*pedicellata* Towns.). Scraptoft (W. B. E. C. 1907, 1906). East Norton, Lowesby. Of this plant Prof. Hackel wrote: "In my view *G. pedicellata* Towns. is a form of *G. fluitans*, not of *plicata*."

Festuca rigida Kunth. Tilton Hill.—*F. bromoides* L. Moira (N. H. T.). Beacon Hill, Kirby Muxloe, Lutterworth, Medbourne. —*F. ovina* L. Hallaton, Lutterworth. — *F. rubra* L. Breedon, Breedon Cloud Quarries (N. H. T.). Ratby. — h. *fallax* Hackel. Coleman Road.—*F. pratensis* Huds. Charnwood Forest, between

Ashby and Blackfordby (N. H. T.). Botcheston (W. B. E. C. 1906). Ingarsby.

Bromus unioloides Kunth. Belgrave, *W. B.* (W. B. E. C. 1910).—*B. erectus* Huds. Lutterworth.—*B. racemosus* L. New Humberstone.

Brachypodium pinnatum Beauv. Ragdale, Saltby.

Lolium perenne L. *b. *tenue* Syme. East Norton, *A. R. H.*

Agropyron caninum Beauv. Sanvey Castle, near Welham.

Nardus stricta L. In Knipton pastures and about Belvoir, *I. E.*

Blechnum spicant With. Foremark (N. H. T.). Martinshaw Wood.

Asplenium Ruta-muraria L. Woodhouse Eaves, Wanlip, Kirby Muxloe, Medbourne, Hallaton, Goadby Marwood.

Ceterach officinarum Willd. Willesley (N. H. T.). Birstall, *L. P. & S.*

Phyllitis Scolopendrium Newm. Shoulder-of-Mutton Hill, *J. E. Jordan*, but now exterminated there.

Lastræa spinulosa Presl. Moira (N. H. T.). Near Ullesthorpe, *H. P. R.*—*dilatata* R. & B. Seal Wood (N. H. T.). Barkby Holt.

Ophioglossum vulgatum L. South Croxton, Tilton, Hungarton, Glooston, Lutterworth.

Botrychium Lunaria Sm. Foremark (N. H. T.). Scraptoft, Hungarton, South Croxton.

Equisetum maximum Lam. Harby Hills, Stathern.—*E. sylvaticum* L. Smisby (N. H. T.).—*E. palustre* L. Lowesby. Peckleton, *L. S. B.* — *E. limosum* L. Lowesby, Quenby, Botcheston, Foxton.—b. *fluviatile* (L.). Aylestone (W. B. E. C. 1906). Lowesby, Botcheston, Medbourne.—*E. hyemale* L. Measham (N. H. T.).

Lycopodium Selago L. Near Ticker Lane, Charnwood Forest, *Rev. W. H. Coleman.* One specimen in a stone quarry at Moira, 1860, *Rev. W. H. Purchas* (N. H. T.).

Chara fragilis Desv. Gracedieu (N. H. T.). — *C. hispida* L. Gracedieu (N. H. T.). South Croxton. — *C. vulgaris* L. Ponds at Eastwell, *I. E.*

Nitella opaca Agardh. Aylestone.

MURAL ECOLOGY.

By Wm. West, F.L.S.

When investigating cryptogamic plants north of Waterville, Kerry, some years ago (1904), I was so struck one morning with the variety of flowering plants on a wall, that I interrupted my day's journey in order to make notes for publication of those I could readily recognize in the last week of May. These notes got misplaced until quite recently. It illustrates a very peculiar scattered formation, to wit, the association of such pairs of plants as *Veronica Beccabunga* (on the *top* of the wall) and *Sclerochloa rigida*, *Cotyledon Umbilicus-Veneris* and *Senecio aquaticus*! The wall was not far from the sea, where frosts are practically absent, and moisture-charged winds are prevalent, a proof of the latter being manifest by the presence of *Lejeunia ulicina* and *L. minutissima* at no great distance. Mud from the road had evidently been placed on the wall-top at some time, I judged. I give the lists in the order in which I wrote them down on the spot:—

Veronica Beccabunga (1 ft. high, in full flower)
Urtica dioica
Dactylis glomerata
Poa trivialis
P. annua
Festuca ovina (a var.)
Lotus corniculatus
Ranunculus repens
Lolium perenne
Senecio Jacobæa
Holcus lanatus
Ranunculus acris
Cerastium vulgatum
Sclerochloa rigida
Plantago lanceolata
Geranium dissectum
Rumex acetosa
Hypochæris radicata
Sisymbrium officinale
Rumex obtusifolius
Plantago maritima
Barbarea vulgaris
Brassica campestris (two forms)
Potentilla Anserina
Myosotis versicolor
Veronica Chamædrys
Heracleum Sphondylium
Ulex europæus (over 1 in. thick)
Arctium Lappa
Poa pratensis

The following were particularly noted down separately as occurring in close association on a continuation of the same wall:—

Veronica Beccabunga (only 4 to 6 in. high, in full flower)
Cotyledon Umbilicus-Veneris
Epilobium obscurum
Cardamine hirsuta
Cerastium vulgatum
Poa annua (luxuriant)
Senecio Jacobæa
Plantago lanceolata
Geranium molle
Festuca bromoides
Trifolium dubium

On getting a further distance from the sea-influence, the flora of the wall seemed to begin to vary considerably, so I wrote another list:—

Cotyledon Umbilicus-Veneris (18 in. high)
Sedum anglicum
Rubus fruticosus
Digitalis purpurea
Bellis perennis
Urtica dioica
Geranium Robertianum
G. molle
G. dissectum
Veronica serpyllifolia
V. Chamædrys
Lathyrus pratensis
Senecio aquatica
S. Jacobæa
Taraxacum officinale
Cerastium viscosum
C. vulgatum
Plantago lanceolata
P. Coronopus
Alchemilla arvensis
Rumex Acetosa
R. Acetosella
Ranunculus acris
Galium Aparine
Euphorbia hiberna
Epilobium obscurum
Carex flacca (very fine)
Cardamine hirsuta
Carduus pratensis
C. arvensis
Jasione montana
Viola sylvestris
Prunus spinosa
Polygala serpyllacea
Achillea Millefolium
Luzula campestris
Sonchus asper
Veronica arvensis
Hypericum humifusum
Ranunculus Ficaria
Daucus Carota
Lotus uliginosus
Rhinanthus Crista-galli
Centaurea nigra
Holcus lanatus
Aira præcox
Anthoxanthum odoratum
Festuca bromoides
Serrafalcus mollis
Lolium perenne
Poa annua
P. pratensis
Pteris aquilina
Dactylis glomerata
Hedera Helix
Lastræa Filix-mas
L. æmula
Blechnum spicant
Polypodium vulgare
Asplenium Trichomanes
A. Adiantum-nigrum

I also jotted down those cellular cryptogams occurring on the same wall which I could easily recognize :—

Brachythecium rutabulum
B. populeum
Eurhynchium myosuroides
Mnium hornum
Campylopus flexuosus
Polytrichum formosum
P. piliferum
Ptychomitrium polyphyllum
Hypnum purum
H. cupressiforme
Mollia brachydontia
Thuidium tamariscinum
Metzgeria furcata
Aneura sp.
Frullania Tamarisci
Parmelia perlata
Lecanora parella
Sticta fuliginosa
Cladonia sp.
Trentepohlia aurea

To account for the occurrence of such a mixture of xerophytes and hygrophytes, one has to take into consideration the constantly moist atmosphere with regard to the latter, and the constant drainage as regards the former. The mesophytes were also quite at home under the combined conditions. Rain falls on two hundred and forty days in the year, but the actual amount is not a very high one—from forty to fifty inches yearly.

TWO NEW SPECIES OF MYCETOZOA.

By G. Lister, F.L.S.

The two following species have lately been obtained from Scotland and Japan respectively. As the sporangia of both are minute and inconspicuous, it is not surprising that they should until recently have escaped observation.

Licea castanea, n. sp. Plasmodium? Sporangia scattered or collected in small groups, sessile, subglobose, or forming short, straight or curved plasmodiocarps, 0·3 to 0·7 mm. long by 0·2 to 0·25 mm. broad, dark chestnut-brown, smooth or wrinkled; sporangium-walls somewhat cartilaginous, pale purplish or nearly colourless, overlaid with a more or less continuous layer of minute bright brown granules, and at length dehiscing along definite lines to form plates or lobes whose margins are slightly thickened and minutely toothed. Capillitium none. Spores in mass pale olive, when magnified almost colourless, smooth, 8 to 10 μ diam.; spore-wall thinner on one side.

This species was discovered in November, 1910, by the Rev. W. Cran at Lesmoir, Aberdeenshire, where it occurred on moss growing on the bark of *Pyrus Aucuparia* and also on the bark itself. About twelve sporangia in all were obtained. In size they resemble the sporangia of *L. minima* Fr., but they are more elongated in shape; they differ also from that species in the very pale and smooth spores, and in the membrane of the sporangium-wall being nearly colourless and having superficial deposits of bright brown granules, 2 to 3 μ diam.; these granules are similar to those incorporated in the walls of *Perichaena depressa* and *P. corticalis*. The deposits are either continuous over the whole surface of the sporangium-wall, or are divided into patches separated by spaces from granules.

Hemitrichia minor, n. sp. Plasmodium? Sporangia scattered, stalked or sessile, globose, 0·2 to 0·4 mm. diam., pale yellowish-buff, somewhat glossy; sporangium-wall membranous, pale yellow, minutely papillose or marked with delicate close-set curved lines of thickening, and having scanty superficial deposits of refuse matter. Stalk black, cylindrical, 0·1 to 0·2 mm. high, enclosing dark refuse-matter; in one case, two sporangia are mounted on a common stalk. Capillitium consisting of a loose network of flaccid yellow threads, 2·5 to 4 μ diam., with few or many often swollen free ends, and marked with three or four faint spiral bands; the threads not infrequently show bulbous expansions, and are either almost smooth, or studded with slender spines 1 to 4 μ long. Spores pale yellow, closely and minutely warted, 9 to 10 μ diam.

This minute species has been gathered on three occasions by Mr. Kumagusu Minakata, in the province of Kii, Japan, amongst moss on the bark of fallen branches. More material is needed before the position of *Hemitrichia minor* can be satisfactorily ascertained. It appears to be allied to *H. Karstenii* (Rost.) Lister, as suggested by Mr. Minakata; it differs in the sporangia being globose and often stalked, in the more delicate sporangium-walls, and in the more or less spinose capillitium. The last character varies in the different gatherings; in one specimen, which is perhaps not perfectly developed, the capillitium threads are almost smooth; in another they are marked with close-set warts and short spines, while in the third specimen the threads are studded with both short and long spines.

DOUBLE DAFFODILS.*

By Helen Saunders.

In the month of March in this year (1910) I bought a bunch of common daffodils or Lent-lilies, gathered in Chittlehampton parish, among which I found one that was double, but not of the ordinary form of *Telemonius plenus*, for it had none of the trumpet or tube-like shape but was nearly flat; the calyx or five outer segments of the perianth being of a pale yellow or primrose colour, the next row a deeper shade, but not so dark as the ordinary daffodil, and so on to the centre. I made inquiries respecting its habitat, and visited the locality with the person who had

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* Reprinted from the Transactions of the Devonshire Association for the Advancement of Science, Literature, and Art, 1910, xlii. pp. 423, 424.

sold the bunch; we found more specimens of the rare double variety, and some partially double. She remarked that she did not know that double ones grew there before her children had gathered some this season, which surprised her. These daffodils are also not like the common large double daffodils, for they are much smaller, some of them having eight pale segments like a calyx, with a bright yellow perfect tube full of petals or segments. I have submitted some to Messrs. Barr and Sons, who write of them as the little double *Pseudo-Narcissus plenus*, which they say is always a more or less variable plant. The first-mentioned double flower they describe as "a chance sport of the *Pseudo-Narcissus plenus*," and add that it probably would not come constant.

Now, what causes a sport? Is it not a condition which is governed by some natural law? I understand that bulbs do not change, but always produce the same kind of flowers, and that varieties are produced from seed obtained by crossings with foreign stock. May it not be that these flowers, growing far from any others, and not being a large community, have been for generations —perhaps centuries—crossing and recrossing each other, until they have by some law of nature become degenerated, and by degrees their reproductive organs have disappeared, and thus they have become double flowers? Some of the partially double daffodils had imperfect stamens; perhaps they had not experienced so many generations of crossings as those which have lost all appearance of these organs, and have become quite double.

I have consulted authorities on the subject, and have been referred to various articles written by expert botanists, but I have not obtained a direct answer as to how single-flowered plants become double. Some gardeners seem to succeed by over-nourishing the plants, others by starving them; some select seed from particular parts of the pods or collect those grown in particular situations; but none of these methods are satisfactory or certain.

It is thought by some that flowers are doubled by the action of insects at the root of the plant, but that does not seem reasonable. I think they might rather destroy the flower than make it a thing of more beauty. Imported single-flowering plants, which produce only double flowers in this country, can easily be understood, as they do not bring their insect agents with them, and other insects cannot do their work for them.

If I am correct in considering that these curious double daffodils are the result of self-fertilization, or the constant crossing of the same stock, I think the mystery of the origin of the *Narcissus eystettensis*, which "has exercised the minds of all writers on daffodils for three hundred years," is partly solved.

THEODORE COOKE.
(1836–1910.)

The late Dr. Theodore Cooke, author of a *Flora of the Presidency of Bombay*, a work on which he was engaged for about ten years, who died on November 5th, 1910, at his residence, Portswood House, Kew, in his seventy-fifth year, was a notable instance of one who took up a serious piece of descriptive work late in life with striking success. The eldest son of the Rev. J. Cooke, M.A., formerly rector of Ardfinan, Co. Tipperary, Theodore Cooke was born at Tramore, Co. Waterford, in 1836. He was educated at Trinity College, Dublin, where he graduated in 1859, and from which University he eventually received the degrees of M.A. and M.Eng. In both the literary and the professional faculty to which he belonged he was a distinguished student. In the former he was Hebrew Prizeman, first Honours man and Senior Moderator, and Gold Medallist in Experimental and Natural Sciences; in the latter, he was awarded special certificates in Mechanics and Experimental Physics, Chemistry, Mineralogy, Mining and Geology. In the year following graduation, young Cooke entered the service of the Bombay, Baroda, and Central India Railway as a constructing engineer, remaining in the service of the company for five years. During this period he came prominently into notice owing to the success with which he supervised the construction of the great iron bridge at Bassein, 4132 ft. in length, which carries the main line northwards from Bombay to Surat. In 1865, however, the Government of Bombay, having to fill the important post of Principal of the Civil Engineering College at Poona, appointed Cooke to this position, the acceptance of which involved his joining the Bombay Educational Department. The selection, whether from the standpoint of professional eminence or from that of general knowledge, was thoroughly justified by results. With great administrative gifts and much skill and tact in dealing with men and affairs, he proved an ideal head of à college, and when the institution of which he held charge widened its field of work and became converted into the well-known Poona College of Science, Cooke remained its Principal and held charge of it until his Indian service closed in 1893. But during the long period of his Principalship Cooke's abilities were utilised in various other directions. He was appointed a Fellow of the University of Bombay, and was long one of its most trusted advisers; he served for years as a Dean of Faculty, and for a time was a member of the Syndicate. Three times he acted as Director of Public Instruction to his Government, and on one occasion he acted as their Director of Land Records and Agriculture.

The adoption of engineering as a profession had never affected his early interest in the Natural Sciences, and field work in connection with these engaged his attention in his leisure hours from the outset of his Indian career. As time went on, however, his spare time was given more and more to botanical as compared with zoological or geological pursuits, and during the later years of his service botanical studies became almost exclusively the pastime of his leisure. These studies were marked by the thoroughness that characterised his official work, and he had already taken the position of a recognised authority on all that related to the identity and distribution of the plants of the Bombay Presidency and Scinde, when in 1891 the Bombay Government were asked to select an officer to take charge of the operations in Western India connected with the newly organised Botanical Survey of India. This post, which he held in conjunction with the Principalship of the College of Science, Cooke at once showed himself thoroughly competent to fill and when, shortly afterwards, he submitted a proposal for the preparation of a local Flora of the Western Presidency, his suggestion received the hearty support of the Director of the Survey, the late Sir George King. The proposal, however, failed to meet the approval of the Secretary of State for India, and when Cooke retired in 1893, as there appeared no prospect of his being permitted to prepare his Flora, he accepted an appointment at the Imperial Institute. After holding this post for three years, he definitely retired to the country. Sometime thereafter, however, the opposition to the scheme submitted six years before was withdrawn, and Cooke, returning to London, settled at Kew and began the preparation of the work, the first part of which was published in 1901, the eighth and concluding part in 1908, one part appearing each year with the regularity and precision that marked everything which he did. The work itself is of the highest quality, no statement made elsewhere has been taken on trust, and conflicting views are always carefully weighed and examined. It remains a remarkable and lasting testimony alike to his acumen and his energy.

With the close of the preparation of the Bombay Flora, Cooke did not abandon botanical work. He at once took up as a volunteer the study of certain families of South African plants, of which he prepared accounts that have been published in the *Flora Capensis*. While so employed he was some months ago incapacitated by the illness which has now ended fatally.

Cooke's kindly disposition and his shrewd sense endeared him to an extensive circle of Indian friends, and added to the number those with whom his botanical studies brought him into contact in this country. His University recognised his labours in the cause of higher education by conferring upon him the degree of LL.D.; his public services were recognised by Government, by his appointment to the Order of the Indian Empire in 1891. To the last he was interested in engineering questions, and was a member of the Irish Institute of Civil Engineers. He had, however, a range of interests and sympathies which extended beyond his early professional or his prolonged educational services, and outside the limits of his favourite recreation, botanical study. He joined the

Linnean Society in 1892, shortly after being placed in charge of the Botanical Survey of Western India; he was also a Fellow of the Geological Society, and a member of the Anthropological Institute.

D. P.

SHORT NOTES.

Middlesex Plants (see Journ. Bot. 1910, 269, sqq.).—I have found an earlier record of *Geum rivale* for Middlesex in a MS. note, circa 1770, by Dr. Lightfoot, in the library of the Botanic Garden, Oxford. It reads: "In a boggy meadow on the left-hand side of road from Colnbrook to London on the skirts of the County of Middlesex, about a mile from the great turnpike road, and about 1½ mile from Colnbrook." This is very near the locality whence Mr. Wallis recorded it a hundred and forty years later. The *Spiræa salicifolia* of Mr. Loydell's collection (see p. 272) is said by Mr. A. Bruce Jackson to be *S. Douglasii* Hook., a planted shrub. Mr. C. B. Green tells me the locality for *Alchemilla alpestris* (l. c.) was a copse near Dew's Farm, Hanfield. It may be well to add that possibly many of Loydell's localities were already known to other workers, and that in some cases Mr. C. B. Green and Mr. J. E. Cooper told him of them or even gave him specimens, and he sometimes omitted to put their names on the labels. The spellings "Yewsley" and "Apperton" are as given on the Ordnance Map. Drayton means, in the case of alien plants recorded by me, the deposits of street sweepings and house refuse on the banks of the canal west of West Drayton Station and the branch line to Uxbridge, and north of Drayton Mill. It must also be borne in mind that in the National Herbarium is the large collection of Middlesex plants made by Mr. J. Benbow, many of which would probably antedate Loydell's specimens.—G. Claridge Druce.

[We cannot but think that far too much importance is being attached to Loydell's work, especially as to whether plants collected or recorded by him were "already known to (or "antedated") by other workers." As we have said more than once, this matter of "first records" is assuming a prominence altogether disproportionate to its importance, which indeed is very slight.—Ed. Journ. Bot.]

Sibthorp's Plants.—The following may be added to the Lincolnshire plants recorded in Journ. Bot. 1910, 257: *Linum perenne* L. Circa Stamford and Ancaster.—*Sambucus Ebulus* L. Stoke, 1780.—*Galium erectum* Huds. Easton, 1780.—*Dipsacus pilosus* L. Easton.—*Oxycoccus quadripetalus* Gilib. "The inhabitants of the fens of Lincolnshire draw annually a considerable revenue from the commerce of the cranberry, which they disperse over the whole kingdom."—*Gentiana Pneumonanthe* L. Doddington Moor. (Also recorded in Moris. Hist. Oxon, 483, 1699.)—*G. campestris* L., *G. Amarella* L. In ericet., 1780.—*Polemonium* *cæruleum* L. Circa Stoke prope Grantham, 1780. — *Rumex limosus* Thuill. Crowland.—*Potamogeton natans* L., *P. gramineus* L.—*Cladium Mariscus* Br. In paludibus.—G. Claridge Druce.

REVIEWS.

Twenty-Sixth Annual Report of the Watson Botanical Exchange Club, 1909–1910. Cambridge : J. Webb & Co., Alexandra Street. 1910.

We ought to have noticed sooner this Report, which in many respects presents an interesting contrast with that of the Botanical Exchange Club which was reviewed in November last. While a comparison of the two Reports confirms us in our view that it would be desirable, in the interests of British botany, that some union between the two clubs should be brought about, the increasing differences between them support the contention of those who maintain the necessity of their separate existence.

As at present conducted, the Report of the Exchange Club, as we then pointed out, contains much which can hardly come legitimately under that title: that of the Watson Club continues to confine itself to notices of the plants sent in by members. The former is dominated by one of the most energetic of our British botanists; for the latter, with what seems an excess of modesty, no name is given as editor, and we are left to conjecture whether that office is filled by the Hon Secretary (Mr. George Goode) or by the Distributor for the year (Dr. Eric Drabble), whose names alone appear in the prefatory notes. The two Reports agree in giving much information of general interest which we think might advantageously find a place in our own pages. This is not, as might appear, a purely selfish view, although it must be admitted that, since the establishment of separate journals for Scotland and Ireland and of various local magazines which naturally have the first claim upon matter connected with their districts, it has been more difficult to fill our pages with matter interesting to the British botanist; but there are those who do not belong to either of the clubs and more who do not belong to both, and these, to say nothing of Continental botanists, may easily remain in ignorance of what is contained in one or other, or both, of the Reports.

We cannot help thinking that in both Reports there are certain details which might be altered with advantage—for example, the headings of the paragraphs. It is difficult to see why a paragraph should be headed "*Rosa hibernica* var. *glabra*" when five persons proceed to show that whatever it is, it is not *that*: and again, *Erophila inflata*, of which the communicator says "Plants from this wall were named *E. inflata* by the Rev. E. S. Marshall," is followed by a remark from Mr. Marshall, "I cannot feel at all sure that the present plants are true *inflata*," while Mr.

Bennett would say "not *inflata*." "*Fumaria purpurea* Pugsley"—"not *purpurea*," says Mr. Pugsley. *Sisymbrium hispanicum* Jacq., so named by the sender, "will not do for *hispanicum*," says Mr. Holmes, while Mr. Dunn believes it to be "a form of *Brassica elongata*." Of course, if the Reports of the Clubs were to be regarded as unpublished documents for circulation only among the members, the case would be different; but they are duly published and circulated, and thus claim public recognition. Surely also it is carrying the present enthusiasm for authentication to excess when it is considered necessary to submit to a referee so unmistakable a plant as *Iberis amara* and gravely to print "Yes, E. S. M." after the record—by the way, why is it recorded at all from Princes Risborough, seeing that it is one of the commonest of plants on the chalk throughout that district? The note which we quote later as to *Lotus corniculatus* var. *crassifolius* exhibits this authenticitis in an acute form: we quote it because it confirms the view we have more than once expressed as to the desirability of reducing the number of "varieties" in our lists, or at any rate of investigating their claims to be so regarded. We are glad to note in the Report a consensus towards the discouragement of the invention of new "varieties." We note, however, that the Report includes without comment *Cnicus acaulis* var. *caulescens*—a "state," if ever there was one.

We proceed as usual to give a few of the more interesting notes: a large number of these, however, relate to critical genera —*Viola*, *Rubus*, *Rosa*, *Hieracium*, *Mentha* (the notes throw an interesting light on Mr. Williams's summary dismissal of the genus in his *Prodromus*), *Euphrasia*, *Ulmus*, *Betula*, *Salix*, and *Carex*—and these, except one on *Viola*, are not included. The names of the authors, indicated by initials in the Report, are here printed in full.

Viola. The Woodwalton Fen violets are at once interesting and puzzling. In addition to the three species, *V. stagnina*, *V. canina* b. *crassifolia*, and *V. montana*, there exists a series of intermediates or hybrids; some of these, no doubt, possess characters referable to the three types; others appear to be crosses between two only of the typical species. In naming these for club distribution I have treated them as natural hybrids between the two species they most nearly approach in general appearance, and in such characters as seem important. No artificial hybrids have been attempted in this group; there can be, therefore, no certainty of hybridity, although the fact of artificial hybrids having been successfully made by the late Mr. Beeby and other botanists among the *Canina-Riviniana* groups inclines one to the probability of hybrid origin. *V. montana* forms bushes from a foot to one and a half feet high, the habit ascending, as in *stagnina*, not spreading, as in *canina* b. *crassifolia*. The flowers, though not so rounded nor so small as those of *stagnina*, are of the same pale colour, whereas those of *canina* are of a bright blue colour; the corolla spur of *stagnina* and *montana* is greenish, that of *canina* bright yellow. The leaves of *montana* are long, broad, and unsymmetrical in outline; those of *canina* are thick and punctate, with a cordate base; those of *stagnina* are long, narrow, and pointed.—E. S. Gregory.

Tunica Saxifraga Scop. At the foot of a land cliff on ground adjoining a public path near the railway station, Tenby, Pembrokeshire, v.-c. 45, Sept. 2, 1909. First sent to me for naming in the summer of 1908 by Mr. G. Ginger, a Manchester botanist. I visited the spot in the summer of the following year, and found the plant in great plenty. It had evidently been established there for many years, and had most likely escaped from a garden at the top of the cliff. Mr. S. H. Bickham tells me he saw the plant in this station about three years ago, and that it occurs elsewhere in the same neighbourhood.—C. Bailey.

Lotus corniculatus L. var. *crassifolius* Pers. (1) Sandhills, New Brighton, Cheshire, v.-c. 58, May and June, 1908.—E. & H. Drabble. Yes.—A. Ley. Seems right.—E. F. Linton. Apparently correct. — E. S. Marshall. (2) Herne Bay, E. Kent, v.-c. 15, July, 1909.—W. R. Sherrin. Probably correct.—A. L. Quite likely.—E. F. L. Right, I believe; but I suspect that the alleged variety is no more than a "state," the thickened foliage being due to its habitat.—E. S. M. This does not appear to be so extreme as the plants I have collected on the Cheshire and Lincolnshire coasts. In addition to its fleshy leaves, *crassifolius*, as I know it, has larger and brighter yellow flowers than the thin-leaved inland form. I quite agree with Mr. Marshall in regarding *crassifolius* as a mere "state."—E. D.

Pyrus latifolia Syme (*Sorbus latifolia* Pers.). (Ref. No. 3370.) By the Conan River, about a mile above the bridges, near Conan, E. Ross, v.-c. 106, July 16, 1909. Dr. Hedlund has determined this, which I first found there in 1892, as *Sorbus latifolia*. A fine old tree, fully forty feet high, and fruiting profusely. Although not obviously planted, I consider it a very doubtful native; but I am not aware of its being grown in the neighbourhood, nor is it very ornamental when living, as the upper surface of the leaves is rather dull green. The known area of this species, however, makes its occurrence as a truly wild plant in N. Scotland *prima facie* improbable; and we saw some aliens near at hand, more or less well established, which may have been derived from the gardens at Brahan Castle, higher up the stream.—E. S. Marshall.

Galium erectum × *verum*. In June, 1908, Mr. James Groves went with me to Woodwalton Fen. In the rough part where *Luzula pallescens* Bess. grows he called attention to a *Galium* which we both at first thought was a cream-coloured form of *erectum*. As we could not find any *verum*, we concluded that our sense of colour was at fault. Later on in the year Mr. Druce went with me to the same part of the fen, and at once called my attention to what he, too, thought was a cream-coloured form of *erectum*. At this time the *Galium* was in full flower, and we were soon convinced that many of the plants were positively cream-coloured. We could not find any *verum*. Later in the day we went to another part of the fen, about a mile distant, and there found plenty of *erectum*, *verum*, and many intermediates in colour, the most beautiful being a very soft yellow, quite different from the rank yellow of *verum*. Last year I found that *verum*, *erectum*, and the intermediates cover a large space in the rough fen—thirty acres or more.—E. W. HUNNYBUN.

G. asperum Schreb. Downs above Reigate, Surrey, v.-c. 17, June 6, 1909. According to Dr. Williams (Prodr. Fl. Brit. part 5, p. 219) this Reigate plant should be labelled *G. austriacum* Jacq., leaving *G. asperum* to represent the scarcer plant with small fruits (1 mm. broad), densely hispid lower leaves and lower part of stem. The Reigate plant, on the other hand, has fruits 2 mm. broad, and non-pubescent (or only ciliate) lower leaves and lower part of stem. Certainly it is no form of *G. erectum* Huds., which has different petals, &c., and grows close by the Reigate plant. The fruits of "*sylvestre*" and *Mollugo* (including *erectum*) seem almost identical. Coste says of *sylvestre*, "fruits . . . . finement chagrinés"—of *Mollugo*, "fruits . . . . chagrinés."—C. E. SALMON. I think this is *G. asperum* Schreb. (= *G. sylvestre* Poll.), but I have seen a reduced state of *G. erectum* Huds. very like this on the downs above Paddlesworth, E. Kent, at 600 ft. — E. S. MARSHALL.

Centaurium pulchellum Druce, forma. Berry Head, S. Devon, v.-c. 3, Aug. 9, 1909. A dwarf subcapitate form growing in short turf. *C. umbellatum*, which grew with it, retained its normal form, and did not approach its variety *capitatum*. It seems to be either *Erythræa pulchella* Fr. forma *littoralis vulgaris* Wittr., "sepals, petals, and stamens often tetramerous," or *E. pulchella* f. *contracta* Wittr., "internodes scarcely or not developed, little branched." The flowers in these specimens are both tetramerous and pentamerous, the former predominating and not confined to the smaller examples. — A. H. WOLLEY-DOD. The form this species assumes on the short turf of pastures exposed to sea breezes; very different-looking to the more simple erect form of damp flats not so exposed.—E. F. LINTON.

Verbascum virgatum Stokes. Waste ground, Ashton Gate, Bristol, N. Somerset, v.-c. 6, July 26, 1909. The locality is the site of some abandoned ironworks, where the plant has been known for several years and seems to be increasing. — IDA M. ROPER. This is not *V. virgatum* but *V. Chaixii* Vill., a Continental species which has been found as an alien in one or two places in England. A plant recently sent to the B. E. C. by Rev. H. J. Riddelsdell as a form of *V. nigrum* turned out to be *V. Chaixii*, which appears to have been doing duty for *V. nigrum* in Glamorganshire. It differs from *nigrum* in having a branched inflorescence, the groups of flowers being less approximate. The lowest leaves are not cordate, but are narrowed into the petiole, the leaf-margin being irregularly sinuate. See B. E. C. Reports, 1908, p. 390, and 1909, p. 466.—A. B. J.

Euphorbia Cyparissias L. Epsom Downs, Surrey, v.-c. 17, May 16, 1909. Mr. C. E. Britton and I were pleased at finding a small clump of this, containing many hundreds of plants, on the chalk downs, amongst furze, &c., and looking quite native. It may probably be, as suggested by Mr. Dunn (*Alien Flora*, p. 169), a native of England, as it grows in Normandy, &c., in similar dry chalky situations. Other *native* stations in England would appear to be Dover, Kent (Fl. Kent, Hanb. & Marsh., p. 308); W. Glos. (Journ. Bot. 1908, p. 358); near Sulham Wood, Berks (Fl. Berks., Druce, p. 438); and Whitbarrow, Westmorland (Eng. Bot. ed. 3, viii. p. 106).—C. E. Salmon. (See also Rept. B. E. C. 1909, p. 469.)

British Ferns and their Varieties. By Charles T. Druery, F.L.S. Illustrated with 40 Coloured Plates, 96 Nature Prints and 319 Woodcuts and other Illustrations. 8vo, cl. pp. xi. 458, price 7s. 6d. net. Routledge & Sons [not dated].

In this heavy and handsome volume Mr. Druery gives us what is undoubtedly the most complete enumeration in existence of the varieties of British ferns, with the growth and study of which his name has for a long period been associated. The term "variety," as applied to ferns, has a signification differing widely from its meaning in connection with phanerogams; however insufficient may be the grounds on which these latter are established, their importance is immeasurably greater than that which suffices for fern "varieties," which include forms, variations, and monstrosities. Looking through the hundreds of names in this volume—some of them sufficiently odd (e. g. *Blechnum spicant concinnum Druery* and *B. s. cristatum Huddart*) and many consisting as do these of four words—one is impelled to wonder what can be the use of thus distinguishing plants for which practically no character is or can be given: for example, all that we are told of the last-named is "Fine crested form found Windermere." Some names are even odder than these and the information given is even less: for example—"*B. s. serratum Airey No. 1*: the parent of *plumosum Airey*; a markedly serrate form, but not tripinnate." The meaning is at times obscure: e. g. "*Polypodium vulgare cornubiense*. Found in Cornwall by Mr. White and others, *as a result of which*[*] it has also been named *elegantissimum* and *Whitei*." This is a curious plant, "producing indiscriminately three kinds of fronds, *viz.* perfectly normal ones, very finely cut ones, consisting of tripinnate or even quadripinnate, very narrow segments, and a coarser type of these; one and the same frond may display all three types of cutting; the spores invariably yield the same inconstant form." Some other varieties are certainly very extraordinary—e. g. *Athyrium Filix-fœmina Victoriæ*, of which three figures are given, with an interesting account of its discovery: "This remarkable fern comes quite true from spores as regards its cruciate and cristate character, but we have never seen a seedling the size of the original, the fronds of which we have had over a yard long."

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[*] Italics are ours.

The arrangement of the book is alphabetical, and there is no synonymy, either in text or index; this will be inconvenient for those who are not familiar with the nomenclature adopted—*e. g.* they will find no mention of *Nephrodium* in the contents, though it is mentioned under *Lastræa*—which by the way is spelt "Lastrea" throughout. It is rather surprising to find *Botrychium* and *Ophioglossum* included in their place in the alphabet; their inclusion among "ferns" is misleading, and, as they practically present nothing worth mentioning in the way of variation, unnecessary.

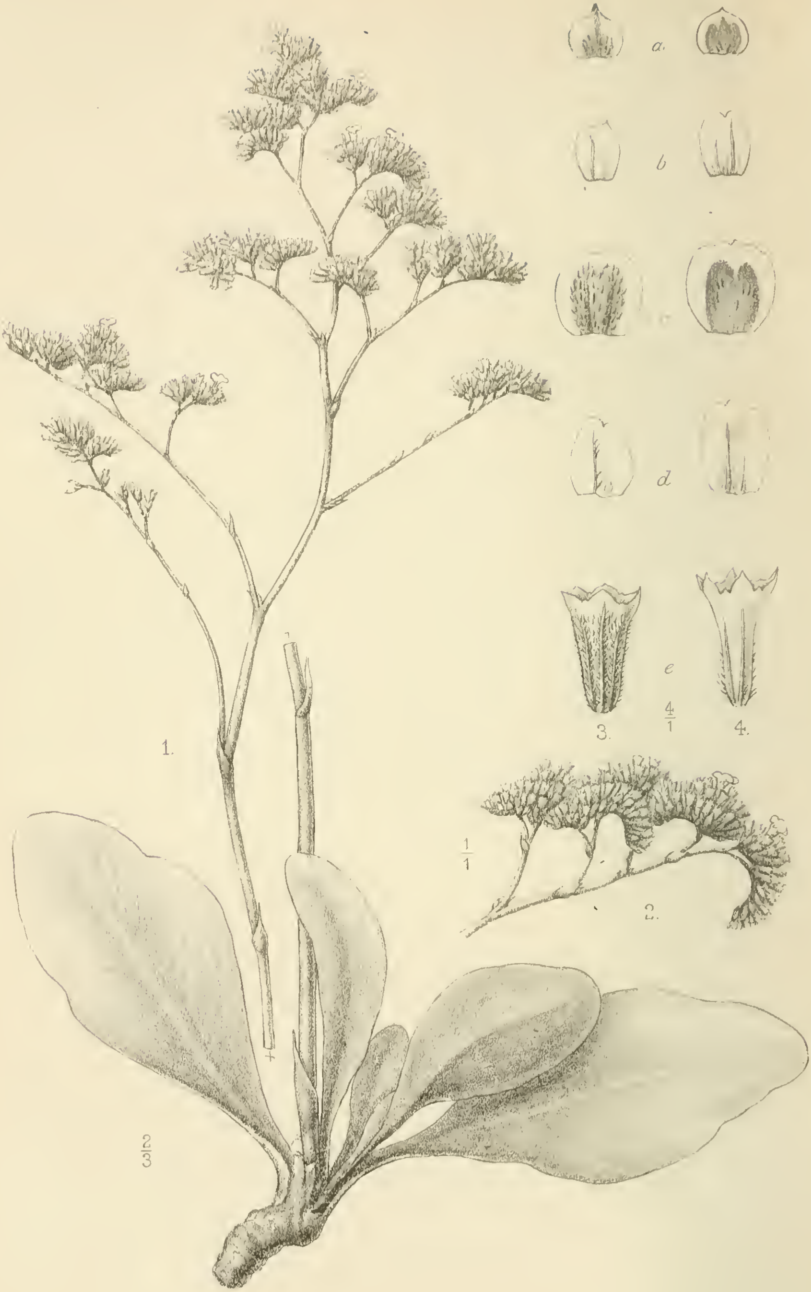
There are useful introductory chapters on the life-history of Ferns (well illustrated), crossing and hybridizing, "multiple parentage," propagation and culture, selection, and "types of variation." The chief value of the book, however, except to fern-growing enthusiasts, will be found in the very numerous illustrations, which show an extraordinary range of form; the ninety-six nature-prints are from the collection of the late Colonel Jones, of Clifton.

BOOK-NOTES, NEWS, &c.

Das System der Biologie in Forschung und Lehre, by Dr. Phil. S. Tschulok (Fischer, Jena, pp. x. 409, price 9 marks), whilst advancing no new theories, contains a careful account of the progress of biological knowledge from 1732. The vast output of work, especially in the last half-century, renders it almost impossible for even the most diligent students to follow and correlate all the work dealing with their branch of knowledge, as indeed is proved by the long years of neglect which Mendel's epoch-making observations had to endure. The author must be thanked for what he has done to digest and bring together in one harmonious whole the most important systems of biological thought since the date mentioned. We note that he promises to follow up this work by two others—"Das Wesen der Theorien in der Biologie und die Logik der Deszendenztheorie" and "Versuch eine Geschichte der Deszendenztheorie." We shall welcome their appearance.

The Report for 1910 of the Lichen Exchange Club of the British Isles (Jeays, 7 St. Martin's, Leicester, price 6d.) shows a membership of twenty-nine, of whom eighteen are contributing members, who have sent in an aggregate of one thousand and thirteen specimens. We observe in the notes on the specimens the names of two of the new species described by Miss Lorrain Smith in this number of our Journal; it is, we think, generally recognized that the publication of *nomina nuda* is undesirable. The Secretary, Mr. A. R. Horwood, contributes some notes, which include a notice of Bruce Fink's monograph of the Lichens of Minnesota.

Correction.—The name appended to the review on p. 38 should be "H. W. Lett," not "C. H. Lett" as there given.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Limonium tomentellum *O. Kuntze.*

NOTES ON *LIMONIUM*.*

By C. E. Salmon, F.L.S.

(Plate 511.)

IX.—Limonium tomentellum O. Kuntze.

The original description of this, under the genus *Statice*, occurs in De Candolle's *Prodromus* xii. 645 (1848), where Boissier gives the following diagnosis:—"*S. tomentella*, foliis oblongolanceolatis obtusis in petiolum breviter attenuatis uninerviis subtus ad nervum dense tomentellis margine ciliatulis cæterum glabris, scapo elato tereti superne subangulato parce et stricte ramoso toto pube densâ brevi rufescente tomentello, spiculis 2–3-floris in spicas secundas oblongas subscorpioideas distiche et dense aggregatis, bracteis rufescentibus velutinis membranaceo-marginatis, exteriori ovato-triangulari cuspidatâ dorso carinatâ interiori duplo majori ovato-rotundâ dorso convexâ obtusissimâ, calycis tubo obconico toto rufescenti-velutino, limbi tubo duplo brevioris lobis rotundis obtusissimis. ♃. In deserto Wolgensi (Claus! comm. a cl. Bunge sub *S. Gmelini*), Sibiriâ (Ac. imp. petrop. sub *S. elatâ* in herb. DC.). Habitus omnino et spicularum magnitudo *S. Limonii* a quâ indumento, floribus densius imbricatis, lobis calycinis rotundatis differt. A *S. Gmelini* floribus majoribus, bracteâ inferiori longiori acutiori dorso herbaceâ, tubo calycino toto velutino indumentoque distincta. (v. s.)."

I have had the opportunity of examining the actual specimens quoted by Boissier from the Volga desert and Siberia and many further examples of this local species from Russia. I think that the description above quoted may with advantage be slightly amended so as to include individuals that otherwise would have to be separately accounted for.

For instance, Boissier mentions that the leaves should be densely tomentose on the vein beneath, rather ciliate on the margin, but otherwise glabrous. This hardly describes, however, his own plants, as the one leaf of the Siberian specimen is minutely hairy all over the under surface, and the leaves of the Volga desert example are distinctly, though minutely, hairy on both sides. The average leaf appears to be one more or less minutely hairy on both sides, with the midrib beneath more densely hairy and the membranous margin glabrous; rarely, one finds almost glabrous leaves even as regards the midrib. Boissier's description of the spikes, too, requires to be slightly modified, as these vary considerably (as we have seen before in the case of *L. vulgare*, *L. Gmelinii* and *L. bellidifolium*) and may be either dense or lax-flowered.

In 1856 there appeared a most interesting article by E. R. von Trautvetter (in Mélang. Biol. Bull. Acad. St. Petersburg) upon the species under discussion and its near allies. He there (p. 352) gives as the aggregate species *Statice Gmelini* Willd., and subdivides it into *α typica*; *β scoparia* (= *scoparia* Pall.) consisting of three forms, 1 *minor*, 2 *scorpioidea*, 3 *ramosissima* (=*Meyeri* Boiss.); *γ steiroclada*; and *δ tomentella* consisting of two forms, 1 *trachycaulis*, 2 *glabella*.

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* See Journ. Bot. 1903, 65; 1904, 361; 1905, 5, 54; 1907, 24, 428; 1908, 1; 1909, 285.

This exhaustive paper shows that much time and thought had been given to these difficult and varying forms, but I should be unwilling to adopt Trautvetter's classification, as I have yet to be convinced that *tomentellum* cannot be clearly and specifically (as far as any *Limonium* may) separated from all *Gmelini* forms by the shape of the calyx and the presence in varying quantity of minute hairs on scape, leaves or bracts.

I have not seen examples verified by Trautvetter of the forms *trachycaulis* and *glabella*; he says that they may be distinguished respectively by a hairy and a glabrous scape, and that *trachycaulis* is the normal plant. I have never seen any example of *tomentellum* with an absolutely glabrous scape, although the amount of hairiness varies a good deal in individuals, and it may be possible that the more glabrous specimens indicate a crossing of *tomentellum* with *L. Gmelinii*.

Statice sareptana Becker. Although this plant is mentioned by Becker in 1854 (Bull. Soc. Nat. Mosc. I. p. 454), the first description I can find of it is in 1858 in the same Journal (xxxi. I. p. 12). The following is a translation of the diagnosis:—"*Statice sareptana* has hitherto been taken for a young plant of *S. latifolia*. It is, however, a good species, as the old plants show always thin roots, smaller, not very rough leaves, few, not very patent branches, longer, redder flowers and narrower, brown seeds. *S. latifolia* has, as is well-known, broad, almost black seeds, leaves one foot long and very rough, and 'fathom-long' (fadenlange) 1–3 inch thick roots. The leaves of both species are always dry and never exude salt like the leaves of *S. tomentella*, to which, when they dry, white salt frequently adheres."

Becker evidently considered his plant as related to *S. latifolia* rather than *S. tomentella*, but after a careful examination of a number of authentic specimens of *S. sareptana*, named by Becker himself, and a comparison with numerous plants of *tomentella* (some verified by Becker) and *latifolia*, I have come to the conclusion that we must either consider it distinct from both or class it as a variety of *L. tomentellum*. Nyman (Conspec. Fl. Europ. 609, 1881) adopts the latter course, calling it, however, a subspecies, and Gandoger (Nov. Conspec. Fl. Europ. 396, 1910) follows this arrangement. In the examination above referred to I was much struck by the amount of variation as regards hairiness of scape, leaves and bracts. In some examples the bracts were practically glabrous, in others distinctly hairy, and even on the same individual, variations occurred. This hairiness of bract surely indicates an affinity with *L. tomentellum*, as the bracts of *S. latifolia* are quite glabrous.

For the present, I prefer to regard it as a variety of *L. tomen-*

tellum, distinguished from that, usually at a glance, by the more-branched scape with numerous sterile branches and laxer spikes, and, at a closer inspection, by being much less tomentose on the scape, by the almost glabrous bracts (the outer one more herbaceous also), and by the acute calyx-lobes. As far as I have been able to judge from dried specimens, the character mentioned by Becker regarding the presence of salt on the leaves holds good, and is yet another distinction. From *S. latifolia* the plant is easily separated by its larger calyx (with often intermediate teeth), more glabrous scape, less rough leaves, more herbaceous outer bract, &c.

It has more than once crossed my mind that *S. sareptana* might be the result of *L. tomentellum*, with its decidedly hairy bracts and calyx and rounded calyx-lobes, crossing with *S. latifolia*, which has glabrous bracts, less hairy calyx and acute calyx-lobes. A careful examination of the living plants in their native surroundings would probably soon decide this point, which, if proved, would explain in a great measure the very varied facies which the plant presents.

I have been unable to find any figures of *L. tomentellum* that can be called satisfactory, hence the plate now given. Trautvetter (*l.c.* 357) asserts that the *S. Gmelini* of Reichb. Icon. Crit. 237 is his *S. tomentella* f. *trachycaulis*, but as that figure indicates a plant with a very lax spike and acute calyx-teeth, it would seem to fit var. *sareptanum* much better and to this I should assign it.

The *S. scoparia* Pall. of Reichb. Icon. Crit. 236 is indicated by Trautvetter as his *glabella* form of *tomentella*, but I think, in spite of the rather large flowers shown on the plate, it really represents *L. Gmelinii* as noted in Journ. Bot. 1909, 287, and has nothing to do with any form of *L. tomentellum*.

The synonymy, description and distribution of *Limonium tomentellum* and its variety are as follows:—

LIMONIUM TOMENTELLUM O. Kuntze, Rev. Gen. Pl. ii. 396 (1891).

Statice tomentella Boiss.! in DC. Prodr. xii. 645 (1848); Ledeb. Fl. Ross. iii. pars 1, 461 (1847–9).

S. Gmelini Bieb. Fl. Taur. Cauc. i. 250 (1808); Roem. & Schult. Syst. Veg. vi. 778 (1820); non Willd.

S. Gmelini W. δ *tomentella* Trautv. f. *trachycaulis* Trautv. in Mélang. Biol. Bull. Acad. St. Petersb. 357 (1856).

S elata in hb. DC.! non Fisch.

Exsicc.—F. Schultz, herb. norm. nov. ser. Cent. 9, 896! Becker, Pl. Wolg. infer. 44!

Planta plus minusve *hispidula*; folia plus minusve *hispidula*, tuberculis albidis incomposite adspersa; scapus sæpius *supra medium* ramosus; rami inferiores steriles *nulli aut raro pauci*; spicæ breves et *densifloræ*, raro laxifloræ; bractea exterior *fere omnino membranacea*, plus minusve *hispidula*, raro fere glabra; bractea interior quam bractea exterior vix duplo longior, plus minusve *hispidula*, raro fere glabra; calyx crassus, *copiose hirsutus* aut *velutinus*, raro fere glaber; calycis lobi *brevissimi triangularo-rotundati* aut acutiusculi, dentibus intermediis interpositis.

Plant 25–55 cm. high, more or less finely hairy. *Leaves* more or less finely hairy (with occasionally stellate hairs) on both sides, rarely almost glabrous, pinnately veined, broadly-or-oblong-obovate or ovate, blunt or more acute, often emarginate, usually mucronate, normally rather shortly petioled, showing white tubercles when dry. *Scape* more or less finely hairy (with usually some stellate hairs), rarely almost glabrous, erect, slightly flexuose, branched usually from above the middle, sterile branches absent or very few. *Branches* and *branchlets* ascending or ascending-patent and recurved. *Scales* triangular-acuminate, usually finely hairy, never foliaceous. *Spikes* patent usually scorpioid, short and rather dense-flowered, rarely longer and lax-flowered. *Spikelets* 1–2 flowered, sometimes with an additional abortive one. *Outer bract* $1\frac{1}{4}$–$1\frac{3}{4}$ mm. long, orbicular-or-triangular-ovate, apex more or less acute, keeled with the keel projecting as an apiculus, usually wholly membranous except for slight herbaceousness near base, more or less finely hairy (rarely almost glabrous). *Middle bract* $1\frac{3}{4}$–2 mm. long, irregularly oblong-ovate, apex truncate or rounded, hyaline with veins, glabrous. *Inner bract* $2\frac{1}{2}$–$3\frac{1}{4}$ mm. long, orbicular-ovate, with broad membranous margin which is often, together with herbaceous portion, emarginate or jagged at apex, more or less finely hairy (often velvety) over herbaceous portion (rarely almost glabrous), usually a little less than twice as long as outer bract. *Bracteole* 1 or absent, $2\frac{1}{2}$–$2\frac{3}{4}$ mm. long, irregularly ovate, apex rounded, pointed or jagged, hyaline with veins, glabrous (rarely with a few hairs). *Calyx* $3\frac{3}{4}$–$4\frac{1}{4}$ mm. long, stout, densely hairy (or velvety) on veins and between same from base to about 1 mm. from tip of lobes, or less hairy and then chiefly on veins (rarely almost glabrous); calyx-lobes very short ($\frac{1}{2}$ mm. or less) rounded-triangular or (rarely) more acute, short sub-lobes usually present; veins of calyx strong, not reaching to base of calyx-lobes. *Corolla* with lobes emarginate.

Differs from all forms of *L. vulgare* and *L. Gmelinii* by the presence of minute hairs on scape, leaves, and bracts.

Distribution.—European Russia, S. E. (Gouvs. Saratoff! and Astrakhan!) Sarepta! Siberia! Russia, S. & S. W. (Nyman).

L. TOMENTELLUM O. Kuntze var. SAREPTANUM.

Statice Gmelini Reichb.! Icon. Crit. Cent. 3, 37 (1825); non al.

S. sareptana Becker! in Bull. Soc. Nat. Mosc. xxi. I, 12 (1858).

S. tomentella Boiss. subsp. *S. sareptana* Beck. Nyman Conspec. Fl. Europ. 609 (1881); Gandoger, Nov. Conspec. Fl. Europ. 396 (1910).

S. intermedia Czern. (*fide* Gandoger, *l. c.*).

Icon.—Reichb. Icon. Crit. 237!

Exsicc.—F. Schultz, Herb. Norm. Nov. Ser. Cent. 13, 1211! Becker, Pl. Wolg. infer. 42!

(The description given below is contrasted with that of the type; characters common to both are omitted):—

Planta *parum hispidula* aut *glabriuscula*; folia tuberculis albidis carentia, sæpius emarginata; scapus sæpissime *infra* *medium* ramosus; rami *inferiores steriles*; spicæ *longiores* et *laxifloræ* spiculis sæpe *non contiguis*; bractea exterior *herbacea* margine membranacea, *fere glabra*; bractea interior quam bractea exterior *paullo plus* duplo longior, *fere glabra*; calyx *tenuior*, *multo minus hirsutus*; calycis lobi breves, triangularo-*acuti*.

Plant very sparingly finely hairy, rarely almost glabrous. *Leaves* usually slightly emarginate, not showing white tubercles when dry. *Scape* often more or less glabrous in upper part, branched from below the middle, numerous sterile branches usually present. *Spikes* rather long and usually quite lax-flowered, often with spikelets not contiguous (as in *L. humile* Mill.). *Spikelets* usually 1-flowered. *Outer bract* herbaceous with a broad membranous margin, apiculate or not, glabrous or almost so. *Middle bract* 1¾–2¼ mm. long. *Inner bract* 2¾–3½ mm. long, glabrous or almost so, a little more than twice as long as outer bract. *Bracteole* 1 (rarely 2), 2½–3½ mm. long, glabrous. *Calyx* 4–4½ mm. long, more slender than that of *tomentellum*, irregularly hairy in lower half (not usually any higher) on veins and sparingly between same, some veins wholly glabrous; calyx-lobes short, but usually slightly longer than those of *tomentellum* (½ mm. or more), triangular-acute.

Distribution.—European Russia, E. & S. E. (Gouvs. Saratoff! and Orenburg!) Sarepta!

It will be noted that all the localities for *L. tomentellum* and variety are inland.

Description of Plate.

1. *Limonium tomentellum*, two-thirds natural size. 2. Portion of spike of ditto, natural size. 3. *a*, *b*, *c*, *d*, *e*, outer bract, middle bract, inner bract, bracteole, and calyx of *L. tomentellum*, all enlarged four times. 4. *a*, *b*, *c*, *d*, *e*, outer bract, middle bract, inner bract, bracteole, and calyx of *L. tomentellum* var. *sareptanum*, all enlarged four times.

THE GENUS *CANEPHORA*.

By H. F. Wernham, B.Sc.

I. The Genus.

This genus of *Rubiaceæ* is, so far as is known, confined to Madagascar; three species only have been described hitherto. An examination of the material available in the British Museum and Kew herbaria has suggested the necessity for some enquiry into the definition and affinities of the species.

Canephora was described originally by Jussieu (*Genera Plantarum*, p. 208, 1789) as follows:—“Canephora. Flores 3–6 intra calicem communem sub-5-fidum, sessiles squamulis distincti. Singulis calix 5–6-fidus. Corolla parva campanulata 5–6-loba. Antheræ 5–6 oblongæ sessiles. Stigma 2-fidum. Fructus . . . . pisiformis coronatus 2-spermus. *Frutex; pedunculi axillares solitarii, a basi ad apicem incrassati, desinentes in calicem communem* *calathiformem. Caracter ex Commersoni specimine Madagascariensis innominato. . . . Confer cum Faramea.*"

Gmelin (Syst. 372, 1791) gives a summary of the generic characters based upon Jussieu's account; he adds a specific name, *C. madagascariensis*, but without description. Lamarck (Encycl. Meth. Illustr. 377, t. 151, fig. 1) in the same year gives a figure of the genus, to which we shall return presently. Willdenow (Sp. Pl. 976, 1797) gives brief descriptions of two species, *C. axillaris* and *C. capitata*, the latter of which has since been recognized as synonymous with *Burchellia capensis* R. Br. The former is described as "C. foliis subrotundo-ovatis, floribus solitariis axillaribus." Poiret (in Encycl. Suppl. ii. 57, 1811) gives the generic characters at length as follows:—

"Le caractère essentiel de ce genre est d'avoir: un calice commun, tubulé, à plusieurs fleurs; un calice propre, a cinq ou six découpures; une corolle campanulée, à cinq ou six divisions; un fruit couronné, à deux semences. Chaque fleur offre :—1°. Un calice commun, d'une seule pièce, tubulé, denté, à plusieurs fleurs séparées par des écailles; un calice propre, presque campanulé, à cinq ou six découpures. 2°. Une corolle monopetale, petite, campanulée, à cinq ou six lobes ovales, aigus. 3°. Cinq ou six étamines; les filamens presque nuls; les anthères oblongues, point saillantes. 4°. Un ovaire inférieur, un peu arrondi, surmonté d'un style filiforme, plus long que la corolle, terminé par un stigmate bifide. Le fruit . . . en forme de pois, couronné par les découpures du calice, à deux loges, à deux semences."

Poiret retains Willdenow's two species: *C. axillaris* is thus described:—

"C. floribus sessilibus, solitariis, axillaribus; foliis subrotundo-ovatis, breviter petiolatis. Arbrisseau dont les tiges se divisent en rameaux glabres, cylindriques, noueux, d'un blanc-cendré, garnis des feuilles opposées, mediocrement pétiolées, ovales, un peu arrondies, fermes, coriaces, luisantes, glabres à leurs deux faces, très entières, longues d'un pouce et plus, un peu aiguës, à nervures fines, distantes, à peine rameuses, presqu' opposées; les fleurs sessiles, axillaires, solitaires, plus courtes que les feuilles."

Poiret also points out that the plant under description was collected by Commerson in Madagascar, so that *C. axillaris* Lam. is almost certainly identical with the plant on which Jussieu based his generic characters, and therefore the type, also, of the *C. madagascariensis* of Gmelin.

Poiret refers the figure (Encycl. Meth. t. 151, fig. 1) to *C. axillaris*; but both figure and description are curiously inaccurate in regard to the inflorescence. The organ, which is in reality a common peduncle bearing a few flowers (see Jussieu's description *supra*), is represented as a long funnel-shaped calycine structure with several teeth at the margin, and at least a dozen small flowers appearing in the mouth.

A. Richard, however, in his generic description of *Canephora* (Mem. Soc. Hist. Nat. Par. v. 261, 1829), refers to the organ in question not as a common calyx but as a flattened branch: "flores in apice ramuli compressi, sensim dilatati et apice cupulæformi"; and, to judge from the specimens in the National and Kew herbaria, this estimate of its nature is correct beyond question. Richard makes the important addition that the ovary is multiovulate; he does not refer to the seeds. De Candolle (Prodr. iv. 617, 1830) includes the genus under the head "Genera rubiacea non satis nota aut loco suo omissa," and his description is based mainly upon Richard's, with the addition, already pointed out by the earlier authorities, that the fruit is two-seeded. The affinity "inter Gardeniaceas Sarcocephaleas post Lucinæam inserendum" is suggested.

Bentham & Hooker (Gen. Pl. ii. 74, 1873–6) base their description upon De Candolle's account, but suggest the inclusion of *Canephora* in the *Mussændeæ*, a tribe characterized by valvate æstivation. This, however, is incorrect; for, as Baillon points out in Bull. Soc. Linn. Paris, i. p. 199, 1879, the æstivation is contorted, a fact which I have been able to verify in all the plants examined.

It would appear, therefore, that this genus should have a place in the *Gardenieæ*, as suggested by De Candolle; and K. Schumann has adopted this course in his account of the *Rubiaceæ* (Nat. Pflanzenf. iv. 4, p. 80). The general appearance and structure of the flower is certainly suggestive of *Gardenieæ* rather than of *Mussændeæ*.

One point in the generic description which needs amendment concerns the number of the floral parts, which has hitherto been given as 5–6 or 5; as will be seen below, four of the five species are 4-merous.

I have had no opportunity of examining fruits or seeds, and so must leave unsettled the rather important question as to whether the presence of one seed only in each loculus of the fruit is to be regarded as a constant generic character; the earlier descriptions seem to point to this conclusion. The *Mussændeæ* have, typically, many-seeded fruits, whereas many of the *Gardenieæ*, e.g. *Tricalysia* (with which *Canephora* is closely associated by K. Schumann), have few-seeded fruits. The existence of the latter character in *Canephora* may thus acquire a certain phyletic importance. In any case, the number of ovules in the immature ovary is small—5–7, according to K. Schumann.

The critical generic characters of *Canephora* may, then, be summarized as follows:—Shrubs or trees, usually glabrous; flower campanulate, with contorted æstivation of the corolla; inflorescence consisting of a few flowers, borne in the hollowed apex of a phylloclade, and surrounded by a common involucre; ovary bilocular, with few ovules.

II. THE SPECIES.

Until 1897 the genus *Canephora* was known by the species *C. axillaris* W. alone. In that year an accurate figure of this species was published in the Hist. Pl. Madag., by Drake del Castillo (t. 444), which forms part of Grandidier's "Histoire" of the island, together with the figure of a second species, *C. Humblotii*, which is distinguished by its long oblong leaves and 4-merous flowers; unfortunately, however, no description of this second species is given.

A third species—also 4-merous—was described by Augustine De Candolle from material collected by Mocquerys (no. 142) in the Maroa district. This is *C. maroana*, of which the author states that "Le *C. Humblotii* doit être très voisin du nôtre. Il en diffère cependant par la forme du limbe."

This being so, the additional species now described appear to be quite distinct. The five species fall conveniently into the clavis exhibited below. The leaf-shape, characteristic as it is, seems to afford the best preliminary guide towards identification:—

Flowers 5-merous, leaves broadly elliptical, mostly 5–6 cm. long
1. *C. madagascariensis.*
Flowers 4-merous, leaves nearly always more than 7 cm. long.
  Leaves rounded at the base, subsessile . . 2. *C. maroana.*
  Leaves acute at the base.
    Leaves narrow-lanceolate, leathery . 3. *C. angustifolia.*
    Leaves broadly elliptical, submembranous 4. *C. Goudotii.*
    Leaves long-oblong . . . . 5. *C. Humblotii.*

Descriptions of these five species are given below; that of the first, upon which the genus was founded, has been revised.

1. C. MADAGASCARIENSIS Gmelin Syst. 372 (1791), *nomen.*
C. axillaris Willd. Sp. Pl. 976 (1797).

Frutex omnino glaber, ramulis subteretibus nodosis, foliis coriaceis nitidis ellipticis apice obtusis basin versus in petiolum brevem plus minus subito angustatis, stipulis triangularibus cuspidatis, inflorescentiis sæpissime 3–4-floris, floribus subsessilibus, calyce campanulato 5-dentato dentibus late triangularibus, corolla campanulata lobis 5 oblongis apice spathulatis quam tubus brevioribus utrinque glaberrima, staminibus 5 subsessilibus antheris linearibus obtusiusculis basi lobatis, stylo filiformi stigmate in duobus lobis subæqualibus diviso, bacca. . . .

Hab. Fort Dauphin, Madagascar, *Scott Elliot*, 2945! (Herb. Mus. Brit. and Kew); *J. Cloisel*, 263! (in Herb. Mus. Brit.).

Folia 5–6 (3·5–7·5) cm. long. × 2·7–2·9 (1·5–3·3) lat. Costæ secundariæ angulo 70°–80° ad venam centralem insertæ, utrinque 6–8 distantes. Stipulæ 2 mm. long. Inflorescentiæ pedicella sub anthesin ca. 1·6 mm. long., ad apicem fere 6 mm. lat. Calyx totus 3·5 mm.; dentes ca. 1 mm. long. Corollæ lobi 3 mm., tubus 4 mm. long. Antheræ, dimidio exsertæ, ad 2·1 mm. long.

This, the species which has been the longest known, is the only one so far known which has pentamerous flowers.

2. C. MAROANA Aug. DC. Bull. Herb. Boiss. sér. ii. 1, 1901, p. 584. I have not seen this plant, but the rounded leaf-base is a remarkable feature. The original description is appended:—

Frutex ramulosus glaber, ramis teretibus, *foliis subsessilibus oblongis* (8–11 cm. longis, 3½–4 cm. latis) *basi rotundatis* apice acuminatis subcoriaceis nervis lateralibus 8–10 adscendentibus

inter se arcuatim connexis, stipulis basi inter se unitis longiuscule cuspidatis. Inflorescentia pauciflora—in specimine uni- vel biflora—pedunculis phyllodineis oblongo-linearibus 4 mm. latis basin versus attenuatis. Flos subsessilis 10–12 mm. longus. Calyx minimus 4-dentatus dentibus triangularibus subconcavis. Corolla infundibuliformis, 4-lobata lobis oblongis 4–5 mm. longis obtusis utrinque glaberrimis. Antheræ lineares ad faucem sessiles apice subulato exsertæ. Ovarium 2-loculare ovulis placentæ axillari insertis. Stylus filiformis stigmate bifido. Discus epigynus annularis niger.

Maroa, en fôret (Mocquerys, 142). Arbuste de 2 à 3 m., à fleurs blanches.

3. **C. angustifolia,** n. sp. Frutex omnino glaber desuper rufescens, ramulis præcipue junioribus angulatis, foliis petiolatis anguste lanceolatis utrinque acutis coriaceis margine reflexo supra nitidis in siccitate nigrescentibus subtus levioribus, stipulis brevibus latis cuspidatis connatis persistentibus, inflorescentiis pauci- (sæpissime 1–2-) floris, floribus manifeste pedicellatis, calyce infundibuliformi 4-dentato dentibus triangularibus, corollæ glaberrimæ late campanulatæ lobis 4 oblongis obtusis quam tubus vix brevioribus, staminibus 4 antheris linearibus acutis basi bilobis filamentis brevibus sed manifestis, stylo filiformi striato in lobis duobus complanatis diviso, bacca. . . .

Hab. Madagascar, *J. V. Thompson* in Herb. Mus. Brit.!

Folia 6–8 cm. × 1–1·8 cm.; petiolus 2–4 mm. Vena centralis utrinque eminens, sæpe rubens; costæ secundariæ utrinque 6–8 patentes nec valde conspicuæ. Stipulæ 4 mm. long., basi 4 mm. lat. Inflorescentiæ pedicella sub anthesin 2 cm. long., ad apicem 5 mm. lat. Calyx totus 3·5 mm. long., dentes ca. 1·5 mm. long. Corollæ lobi 6 mm. long., tubus 7 mm. long. Antheræ 5·5 mm. long. Stilus 9 mm. long.

Apart from the very characteristic leaf-form, this species is remarkable for the relatively large size of the floral parts, especially the anthers, and for the presence of distinct filaments.

The following, again, although nearly allied apparently to Aug. De Candolle's *C. maroana*, seems to be undoubtedly distinct therefrom, in virtue of its broader, elliptic, scarcely acuminate, petiolate leaves, acute at the base, its smaller flowers, and the larger size of the shrub as a whole:—

4. **C. Goudotii,** n. sp. Frutex glaber 4–5-pedalis, ramulis obscure angulatis, foliis pergamaceis petiolatis ellipticis apice subobtusis vix acuminatis basi in petiolum brevem angustatis margine reflexo, stipulis triangularibus cuspidatis in brevem vaginam cohærentibus tardiuscule deciduis, inflorescentiis paucifloris, floribus subsessilibus, calyce infundibuliformi 4-dentato dentibus triangularibus, corolla anguste campanulata lobis 4 ovato-lanceolatis subacutis tubum vix æquantibus utrinque glaberrima, staminibus 4 subsessilibus antheris linearibus acutis basi integris, stylo filiformi stigmate in duobus lobis inæqualibus diviso, bacca. . . .

Hab. "Les montagnes qui bordent les rives du Saramdon." Madagascar, *Goudot* in Herb. Mus. Brit.!

Folia 9–13 cm. × 4·2–5·5 cm.; petiolus 4–7 mm. long. Vena centralis utrinque eminens, costæque secundariæ angulo ca. 70° ad eam insertæ, vix arcuatæ, subtus nec valde conspicuis, supra utrinque ca. 10 eminentes, necnon aliæ minus conspicuæ et irregulariter dispositæ. Stipulæ totæ 5 mm. long. Inflorescentiæ pedicella sub anthesin 3·5 cm. long., ad apicem 4 mm. lat. Calyx totus 3 mm., dentes vix 1 mm. long. Corollæ lobi 3·5 mm., tubus 3·8 mm. Antheræ 2·2 mm. long.

Lastly must be added some account of the species figured without description in Grandidier's *Histoire*. The following is based upon the figure in question:—

5. C. Humblotii Drake, Hist. Pl. Madag. 1897, t. 444. Frutex glaber, ramulis subteretibus, foliis petiolatis coriaceis (?) longiuscule oblongis breviterque acuminatis basi angustatis, stipulis triangularibus mucronatis, inflorescentiis 3–4-floris, floribus sessilibus, calyce subtubuloso 4-dentato dentibus triangularibus obtusis, corolla campanulata lobis 4 plus minus anguste ovatis apice rotundatis quam tubus brevioribus, staminibus 4 subsessilibus antheris lineari-fusiformibus apice subulatis obtusis.

Compared with the figure of *C. axillaris*, the leaves are much longer and relatively narrower; the pedicel of the inflorescence is longer and narrower at the top; the corolla is more deeply lobed; and the anthers are longer and not so stout.

ALGOLOGICAL NOTES.

By G. S. West, M.A., D.Sc., F.L.S.

Among the Algæ I am constantly collecting and those which are submitted to me for examination are many species of considerable interest and about which little is known. New facts concerning the structure and life-histories of some of these Algæ are always coming to light, and our knowledge of their geographical distribution is being gradually extended.

It seems desirable that these numerous facts and records should be published in a collective form rather than as isolated notes which are liable to be overlooked, and I therefore propose to issue periodically a series of "Algological Notes" in which they will be embodied. Critical remarks upon little-known species, discussions upon the validity of certain species, and the systematic position of others will also be included; and, in addition, short reports on small collections of Algæ from various parts of the world will appear from time to time.

I.—Algæ from near Rivadeo, North-west Spain.

A few small tubes of Algæ were collected from running water near the town of Rivadeo by Mr. W. Fawcett in November, 1909, and were forwarded to me by Dr. A. B. Rendle. The material contained thirty-three species of Algæ, among which were a few Desmids and a number of rather interesting Diatoms.

CHLOROPHYCEÆ.—*Netrium Digitus* (Ehrenb.) Itzig. & Rothe, *Penium Navicula* Bréb., *Tetmemorus granulatus* (Bréb.) Ralfs, *Euastrum oblongum* (Grev.) Ralfs.

BACILLARIEÆ.—*Eunotia Arcus* Ehrenb., *E. lunaris* (Ehrenb.) Grun., *E. pectinalis* (Kütz.) Rabenh., *Achnanthes linearis* W. Sm., *Navicula appendiculata* Kütz., *N. atomoides* Grun., *N. borealis* Ehrenb., *N. Brébissonii* Kütz. var. *diminuta* V. Heurck, *N. contenta* Grun. var. *biceps* V. Heurck, *N. cryptocephala* Kütz., *N. falaisensis* Bréb., *N. major* Kütz., *N. peregrina* Kütz. var. *Menisculus* Schum., *N. rhynchocephala* Kütz., *N. stauroptera* Grun., *N. tuscula* Ehrenb., *N. viridis* Kütz., *Stauroneis anceps* Ehrenb., *S. gracilis* Ehrenb., *Vanheurckia vulgaris* (Thw.) V. Heurck, *Gomphonema parvulum* Kütz., *Cocconema turgidum* (Greg.) nob. [= *Cymbella turgida* Greg.], *Nitzschia Denticula* Grun., *N. obtusa* W. Sm., *N. obtusa* var. *brevissima* Grun., *N. Palea* (Kütz.) W. Sm. var. *debilis* V. Heurck, *Hantzschia amphioxys* (Ehrenb.) Grun.

MYXOPHYCEÆ.—*Phormidium tenue* (Menegh.) Gom., *Oscillatoria animalis* Ag., *O. tenuis* Ag.

II.—A DIATOMACEOUS EARTH FROM LEWIS, OUTER HEBRIDES.

Some three years ago Mr. F. J. Lewis, of the University of Liverpool, forwarded me a sample of a Diatomaceous Earth which he had collected to the south of Monach, near Loch Keiter, in Lewis, and recently he has very kindly supplied me with the particulars of its occurrence. The deposit was about 6 or 7 in. in thickness, and was overlaid (1) by a layer of peat from 2½ to 3 ft. in thickness, containing trunks and stools of *Betula alba*, and (2) by some 7 to 9 ft. of peat, derived from *Scirpus lacustris* and *Sphagnum*.

The deposit, which rested upon a few inches of fine sand on rock, is soft and friable, and of a rather dark grey colour. It is a fairly pure Diatomaceous Earth of freshwater origin, consisting of a number of species, two of which stand out conspicuously from the remainder. These two species occurred in great quantity and about equal proportions, and not only are they much the largest species present in the deposit, but are among the biggest of freshwater Diatoms. They are *Surirella robusta* Ehrenb. and *Navicula nobilis* Ehrenb. var. *Dactylus* (Ehrenb.) V. Heurck.

Among the large Diatoms were numerous acicular sponge-spicules.

The matrix of smaller Diatoms consisted of the following species:—*Tetracyclus lacustris* Ralfs var. *emarginatus* (Ehrenb.) W. Sm., *Tabellaria fenestrata* (Lyngb.) Kütz., *Fragilaria capucina* Desmaz., *F. construens* (Ehrenb.) Grun. var. *binodis* Grun., *Eunotia pectinalis* (Kütz.) Rabenh. var. *undulata* Ralfs, *E. prærupta* Ehrenb. var. *bidens* (Ehrenb.) Grun., *E. robusta* Ralfs var. *tetraodon* (Ehrenb.) V. Heurck, *E. Veneris* Kütz., *Navicula major* Kütz., *N. viridis* Kütz., *Stauroneis Phœnicenteron* Ehrenb., *Gomphonema acuminatum* Ehrenb., *G. constrictum* Ehrenb., *G. intricatum* Ehrenb., *Cocconema delicatulum* (Kütz.) nob. [= *Cymbella delicatula*

Kütz.], *Epithemia turgida* (Ehrenb.) Kütz., *Surirella ovalis* Bréb. var. *angusta* (Kütz.) V. Heurck.

Fragments of two species of *Synedra* were also present, viz. *S. Acus* (Kütz.) Grun. and *S. Ulna* (Nitzsch) Ehrenb.

III.—New and Rare British Algæ.

1. Stichococcus scopulinus Hazen, "Ulotrich. and Chætoph. of the United States," Memoirs Torr. Bot. Club, xi. no. 2, 1902, p. 161, t. 22, f. 4–6. This species was collected by Mr. W. B. Grove on wet stones at Studley, Warwickshire, in December, 1909. It seems to be a very characteristic species, having cells 3–3·5 μ in diameter, and up to 10 (or even 12) times longer than broad. It has not previously been recorded for the British Islands.

2. Closterium tumidum Johnson in Bull. Torr. Bot. Club, xxii. n. 7, 1895, p. 291, t. 239, f. 4; W. & G. S. West, Monogr. Brit. Desm. i. 1904, p. 156, t. 19, f. 15–18. The characters of this species were drawn up to include, amongst other forms, the Desmid originally described and figured by Ralfs as "*Closterium Cornu* Ehrenb. var. *β*" (*vide* Ralfs, Brit. Desm. 1848, p. 176, t. 30, f. 6 *a–e*). Of this form Ralfs figured the zygospores, and these are generally accepted as representing the zygospores of *C. tumidum*. They are subrectangular, with retuse sides and produced angles.

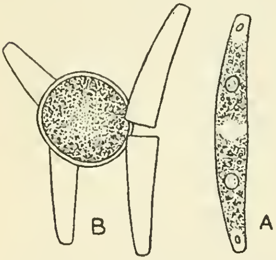

Fig. 1.—*Closterium tumidum* Johns. var. *sphærospora*, var. n. A, vegetative cell; B, zygospore, × 500.

Quite recently Mr. W. B. Grove collected in Warwickshire numbers of rather small forms of *C. tumidum*, agreeing exactly with that figured by W. & G. S. West, *l. c.* pl. 19, f. 15. Many of these had conjugated and the zygospores were subglobose. It seems desirable, therefore, to regard this small form as a distinct variety.

Var. sphærospora, var. n. (Fig. 1). Var. cellulis parvis et brevibus; zygosporis subglobosis vel ellipsoideo-globosis. Long. cell. 48–66 μ, lat. 8–8·5 μ; lat. apic. 3–4 μ; diam. zygosp. 23·5–26 μ.

Hab. Earlswood, Warwickshire, March, 1910.

3. Pleurococcus rufescens (Kütz.) Bréb. This species of *Pleurococcus* is exceedingly rare in the British Islands. In October, 1907, Mr. W. B. Grove collected very fine specimens attached to wood in a rain-water tank at Bewdley, in Worcestershire. Diam. cell. 11·5–17 μ.

4. Richteriella botryoides (Schmidle) Lemm. in Hedwigia, xxxvii. 1898, p. 306, t. 10, f. 1–6. This limnetic Alga occurred in small quantity associated with *Actinastrum Hantzschii* in the surface waters of the canal at Lifford, Worcestershire, in October, 1910. It is quite possible that this and other allied Algæ are

widely distributed in the British Islands, but up to the present this is only the third record of the occurrence of *Richteriella botryoides*.

5. LAGERHEIMIA WRATISLAWIENSIS Schröder in Ber. Deutsch. bot. Ges. 1897, xv. p. 373, t. 17, f. 7. This Alga occurred sparingly among numerous members of the Protococcales in a small pool in the grounds of Studley Castle, Warwickshire, in October, 1906. It is, perhaps, the most distinctive species of the genus, and this is the first British record. In no single instance did the parietal chloroplast possess a pyrenoid, and, therefore, after comparison with Schröder's original description and figure, this must be regarded as additional evidence that the presence or absence of pyrenoids in the chloroplasts of the Protococcales is largely a question of nutrition. Long. cell. 12 μ, lat. cell. 9 μ; long. set. 30–31 μ. (Fig. 2, G.)

6. LAGERHEIMIA GENEVENSE Chodat in Nuova Notarisia, 1895, p. 87, f. 1–12. This minute Alga of the subfamily *Phythelieæ* occurred in the helioplankton of Blackroot Pool, Sutton Park, Warwickshire, in August, 1907. The cells were cylindrical, but proportionately a little shorter than those figured by Chodat, and the bristles were rather short. Long. cell. 8 μ, lat. 4·5 μ; long. set. 7–8 μ. (Fig. 2, A.)

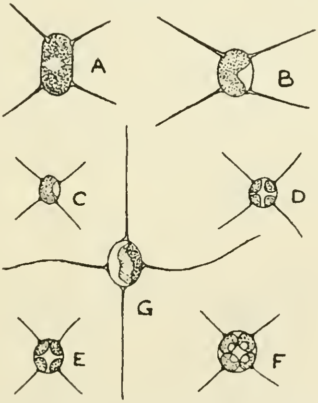

Fig. 2.—A, *Lagerheimia genevense* Chodat. B–F, *L. genevense* var. *subglobosa* (Lemm.) Chod.; C–F, stages in formation of autospores. G, *L. wratislawiensis* Schröder. A and B, × 1000; C–G, × 500.

Var. SUBGLOBOSA (Lemm.) Chodat, Algues vertes de la Suisse, Berne, 1902, p. 188. *Lagerheimia subglobosa* Lemm. in Hedwigia, xxxvii. 1898, p. 309, t. 10, f. 9. I agree with Chodat that this form can scarcely be regarded as a species, as it differs only from *L. genevense* in its ellipsoid cells. It occurred in the helioplankton of Bracebridge Pool, Sutton Park, Warwickshire, in April, 1910; and also in quantity in a small pool in the grounds of Studley Castle, Warwickshire, in October, 1906. From the last-named locality many of the examples showed the formation of autospores, four of which arose in each mother-cell. Long. cell. 5–6·5 μ, lat. 4–4·6 μ; long. set. 10–13·5 μ. (Fig. 2, B–F.)

7. **Ankistrodesmus Spirotænia,** sp. n. (Fig. 3, A and B.) Cellulis solitariis, libere natantibus, inter algas limneticas repertis, angustissimis et multe elongatis; parte mediana angustissime fusiformi, ad polum unumquemque in spinam longissimam tenuissimam et rectissimam subgradatim producta; chromatophora pallide viridi, tæniformi, spiraliter contorta, anfractibus circiter 3½–4, pyrenoidibus nullis. Long. cell. 171–185 μ; lat. max. 2–2·1 μ.

This curious species occurred sparingly among other limnetic Algæ in the surface waters of the canal at Lifford, Worcestershire, in October, 1910. Its exceedingly narrow cells, drawn out at the apices into fine, straight, spine-like processes of great length, and the nature of the chloroplast, are characters which serve to distinguish it. The chloroplast is rather remarkable, consisting of a rather narrow, pale green band, wrapped spirally round the interior of the widest part of the cell, and having about four complete turns. No pyrenoids were observed.

It is of a length approaching the *Closteriopsis*-type, but differs from all the elongated species of *Ankistrodesmus* in the spirally twisted chloroplast.

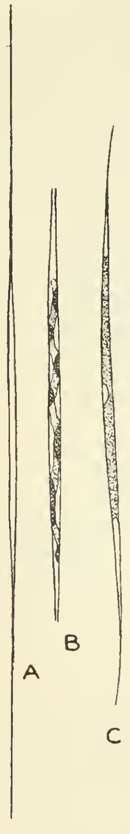

Fig. 3.—A and B, *Ankistrodesmus Spirotænia*, sp. n.; A, outline of cell; B, median portion with chloroplast. C, *A. falcatus* var. *acicularis* (A Br.) G. S. West, an elongated form. A, × 600; B, × 800; C, × 500.

I would here draw attention to a Diatom, *Nitzschia Tænia* W. Sm., from which *Ankistrodesmus Spirotænia* differs in being a member of the Protococcales, and therefore in the possession of a chloroplast, in the structure and nature of its cell-wall, in the equal diameter of its cells when viewed from all sides, and many other characters. I consider this comparison rather irrelevant, but I institute it purposely after reading certain statements made by Mr. G. I. Playfair. In a footnote to one of the most amusing papers which has ever appeared on the *Desmidiaceæ*, this author,* replying to the fact that I had twitted him with having described a common attenuated species of *Nitzschia* (*N. acicularis*) as a *Closterium*, remarks that I was apparently "quite unconscious" of having "described and figured the same Diatom, *Nitzschia reversa*, as *Ankistrodesmus nitzschioides*, sp. n." In the first place, I must remark that Mr. Playfair's description and figure (as far as they go, and they are very imperfect) of "*Closterium naviculoideum*" not only agree very well with *Nitzschia acicularis*, but that author actually states that there was some doubt in his mind as to whether the plant was not the Diatom *Nitzschia acicularis* Smith. Under such circumstances Mr. Playfair had no reason for foisting another synonym upon an already overburdened nomenclature.

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* G. I. Playfair, "Polymorphism and Life-History in the *Desmidiaceæ*," Proc. Linn. Soc. New South Wales, 1910, xxxv. part 2, p. 459.

As regards *Ankistrodesmus nitzschioides*, I may say, first, that I am not "quite unconscious" of any Alga I have described; and, secondly, that my remarks under the diagnosis of the species clearly show that I had carefully considered its resemblance to the attenuated species of *Nitzschia*, all of which I know quite well. The attenuated spine-like apices of this Alga, like those of *A. Spirotænia* and others, are of quite a different nature from the attenuated frustules of any species of *Nitzschia*, and, moreover, the cells are isodiametric. It might also be mentioned that "chromatophora pallide viridi, pyrenoidibus nullis" is a statement of fact.

8. ANKISTRODESMUS FALCATUS (Corda) Ralfs var. ACICULARIS (A. Br.) G. S. West. Some very long forms of this variety occurred abundantly in the reservoir at Barnt Green, Worcestershire, in May, 1910. Long. cell. 146–165 μ; lat. 3–3·4 μ. (Fig. 3, C.)

9. ACTINASTRUM HANTZSCHII Lagerh. in Öfvers. af K. Vet. Akad. Förhandl. 1882, n. 2, p. 70, t. 3, f. 25–26; Schröder in Ber. Deutsch. botan. Ges. xv. 1897, t. 25, f. 3. This rare Alga has few British records. It occurred in small numbers in the surface-waters of the canal at Lifford, Worcestershire, in October, 1910. Long. cell. 16–21 μ; lat. cell. 3–3·5 μ. It is known from the plankton of the River Thames.

10. HYDRURUS FŒTIDUS (Vill.) Kirchn. This member of the *Syngeneticæ* was collected in the swiftly running River Plym at Shaugh Bridge, in Devonshire, in April, 1910. The collectors were Miss Olive E. Hood and Mr. R. H. Whitehouse, who informed me that the current was very strong and the water very cold, due to melting snows on the moorlands from which the river flows. It is an interesting record for one of the southern counties, where one would scarcely expect to find such a denizen of alpine regions. In the British Islands it has been previously recorded from Scotland and North Yorkshire.

11. SYNEDRA ACTINASTROIDES Lemm. in Ber. Deutsch. botan. Ges. 1900, xviii. p. 30. This interesting Diatom occurred in some tow-nettings made in the canal near Lifford, in Worcestershire, in October, 1910. It has not previously been recorded for the British Islands. It belongs to that section of the genus *Synedra* named by Lemmermann "*Belonastrum*," in which the cells are associated to form free-floating colonies, each colony consisting of a cluster of Diatoms radiating from a central point. Long. valv. 54–59 μ; lat. 2·6–3 μ. About 8 cells were present in each colony, but the number, although variable, was well within the limits given by Lemmermann of 4–16. The dimensions were

slightly greater than those of the typical form so frequent in the rivers and lakes of Germany, but were not so great as the measurements of var. *lata* Lemm. (*l. c.* p. 30).

12. Rhizosolenia morsa W. & G. S. West in Trans. Roy. Irish Acad. xxxiii. sect. B, 1906, p. 109, t. 11, f. 5–7; G. S. West in Journ. Linn. Soc. (Bot.) xxxix. 1909, p. 77, t. 3, f. 15–16; W. & G. S. West in *The Naturalist*, 1909, p. 292, and fig. 2 on p. 187. *R. eriensis* H. L. Smith var. *morsa* W. & G. S. West, 1905. This species was found in association with *Synedra actinastroides* in the surface-waters of the canal at Lifford, in Worcestershire. It is a characteristic constituent of the plankton of all the British lake-areas, and its occurrence in the Midlands of England is both noteworthy and interesting. Lat. valv. 4–8·5 μ.

IV.—Diplochæte Collins and Polychætophora W. & G. S. West.

The publication of a second species of *Polychætophora*, namely, *P. simplex* G. S. West,[*] has induced Collins[†] to place both *P. simplex* and *P. lamellosa*[‡] under his genus *Diplochæte*. He states, with some reason, that if *P. simplex* is to be included in the same genus as *P. lamellosa*, then both must be transferred to the genus *Diplochæte*, of which a solitary species was described in 1901.[§] It seems, however, impossible to regard *Diplochæte solitaria* and *Polychætophora lamellosa* as species of the same genus, and my own personal view is that for several reasons they should remain as species of different genera.

There now remains for discussion the systematic position of *Polychætophora simplex*. When I described this plant I had grave doubts whether it should be placed in the genus *Polychætophora* or a new genus created for its reception. The suggestion made by Collins that it should be placed as a species of *Diplochæte* seems to me almost a more erroneous view than its inclusion in the genus *Polychætophora*. The American plant—*Diplochæte solitaria*—possesses flattened cells with thick walls, each cell being furnished with two bristles, usually at opposite poles, and arising from the lower half of the cell. The figure given by Collins shows these bristles to be rather short, stiff and thick, and very different in character from the slender, flexuose bristles of the British plants. Moreover, *Diplochæte solitaria* is a marine Alga epiphytic on *Laurencia obtusa*, a fact which must not be lost sight of. Few genera of Algæ are common to both fresh water and the sea, and it is highly probable that these two plants, *Diplochæte solitaria* and *Polychætophora simplex*, have originated independently from quite different sources among the lower green forms. Under these circumstances, and considering that the characters of each are sufficiently distinctive, I would suggest that the most reasonable, and probably the most correct, way out of the difficulty is to establish a third genus for the reception of the Alga described as "*Polychætophora simplex.*" I would suggest *Oligochætophora* as the name of this genus, and the following as a synopsis of the three genera discussed above:—

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[*] G. S. West, "Some Critical Green Algæ," Journ. Linn. Soc. bot. xxxviii. 1908, p. 279, t. 20, f. 1–6.

[†] F. S. Collins, "The Green Algæ of N. America," Tufts College Studies, Mass. vol. ii. no. 3, 1909, p. 278.

[‡] W. & G. S. West, "Notes Alg. III.," Journ. Bot. March, 1903, t. 448, f. 1–4.

[§] F. S. Collins, "The Algæ of Jamaica," Proc. Amer. Acad. xxxvii. 1901, p. 242.

POLYCHÆTOPHORA W. & G. S. West, 1903. Freshwater. Not known to be epiphytic. Cells subglobose, ellipsoid, or ovoid, *solitary or more usually 2 to 6 aggregated to form a subfilamentous thallus; cell-wall very thick and strongly lamellose.* Each cell furnished with *8–12 long, flexuose, simple setæ* of a delicate character and without a sheath, *mostly arising from the sides of the cells, but also from the dorsal surface.* Chloroplast single, parietal, and often indistinct in its limitations.

1. *P. lamellosa* W. & G. S. West. Diam. cell. 19–35 μ; crass. cell. membr. 2·8–10·5 μ; long. set. 86–183 μ.

DIPLOCHÆTE Collins, 1901. Marine. Epiphytic. Cells ellipsoid and *somewhat flattened, solitary; cell-wall thick and homogeneous.* Each cell furnished with *2 rather short, stiff, simple setæ, arising from the lower half of the cell, usually at opposite poles.*

1. *D. solitaria* Collins. Diam. cell. 25–30 μ; crass. cell. membr. 5–8 μ; long. set. 55-67 μ; crass. bas. set. 5–6 μ.

Oligochætophora, gen. n. Freshwater. Epiphytic. Cells subglobose or ovoid, *loosely aggregated to form very small colonies; cell-wall very thin and homogeneous.* Each cell furnished with *2–4 long, flexuose, simple setæ,* of a delicate character and without a sheath, *arising only from the dorsal surface of the cell.* Chloroplast single, parietal, possessing 2 or 3 small granules of starch.

1. *O. simplex* nob. [= *Polychætophora simplex* G. S. West, 1908]. Diam. cell. 15–20 μ; long. set. 50–210 (plerumque 120) μ; crass. bas. set. 0·6 μ.

THE FLORA OF THE WORMS HEAD,

AND THE NATIVITY OF CERTAIN DISPUTED SPECIES.

By the Rev. H. J. Riddelsdell.

Last June I spent three weeks at Rhosili, a village close to the Worms Head, and at the western extremity of the peninsula of Gower. The peninsula forms the western part of Glamorganshire, and extends some eighteen miles west from Swansea. The coast consists of lofty limestone cliffs, rising to more than 200 ft. at Rhosili. North of the village the limestone is replaced by a considerable hill of Old Red Sandstone, which forms a rocky boggy heathland, producing *Sedum anglicum*, *Drosera*, *Osmunda*, and the like. The hill ends seawards in low cliffs, fronted by a good bay of smooth sand.

The limestone cliffs extend from Rhosili south to the Worms

Head, and thence (with a few breaks) east to the Mumbles, near Swansea. In the neighbourhood of the Head there is little sand; high tide covers the foot of the cliffs.

The Head itself is a very desolate stretch of land, shaped like a long peninsula or island, which in turn comprises three parts or islands connecting by short necks of rough sea-blackened rocks; the whole is joined to the mainland by a very rough and tiresome passage-way of boulders and rocks, exposed only at half tide. Some parts of the Head are precipitous; the largest "island," which is also nearest to the mainland, is precipitous on one side, the other forming a gentler slope. The outermost "island" rises steeply to its extremity, and then drops sheer into the sea.

All over the Head the limestone is too near the surface for cultivation to be possible: it is a great breeding-place for gulls. Sheep are pastured during part of the year.

I examined the flora of the Head and neighbouring cliffs, not in order to get a complete list of the native plants; the list given below does not pretend to that. I wished rather to test the question as to whether some of our well-known species are native or not. The conclusion that is forced on my mind, more and more in proportion as I study the plant associations of such out-of-the-way spots as this, is that we have full right to treat, *e. g. Malva sylvestris* and *Anagallis arvensis*, as real natives of Britain.

Some parts of the land about Rhosili and the villages near are cultivated. Ploughed land comes down in places to within two hundred or three hundred yards of the sea. But there is none, and I believe there can never have been any, within about a mile of the Head, or within two miles of its extreme point. Of course, as birds frequent the Head, and men and animals find their way on to it, the chance of plant introduction is by no means absent; a remark which applies equally well to any part of England and Wales.

The Worms Head is set forth here only as an *excellent* example, more free from complicating influences than others in the neighbourhood, of the occurrence of some species of disputed status. Many localities from the cliffs close by, or from cliffs in other parts of the county, or from wet hollows in sand dunes, &c., could be cited for some of these species. The evidence drawn from the data under consideration is, I believe, strongly in favour of their being native. It is not indisputable; nothing is.

Species were massed variously on different parts of the Head. The outermost island was almost entirely given up to *Silene maritima* and *Statice maritima*. The portion of the middle "island" nearest the mainland, stood out red, to the distant observer, with masses of sorrel. The largest "island" had quantities of gorse on the more level parts, the higher ground being occupied largely with *Helianthemum*, *Silene*, &c. *Scilla verna* was scattered over most of the surface, sometimes so thickly as almost to exclude other vegetation.

Ranunculus acris, *R. Ficaria*, *Cochlearia officinalis*; *C. danica*, in large quantity. *Helianthemum canum*, which likes the rockier and more exposed ground more than does *H. Chamæcistus. Polygala vulgaris*; *Silene maritima* becomes gradually more frequent seawards until it occupies nearly the whole ground. *Cerastium tetrandrum, viscosum, vulgatum, Stellaria apetala, Arenaria serpyllifolia*; *Sagina maritima*, in many forms and sizes, not assignable to any named in the *London Catalogue*, I believe, though var. *densa* occurs on Burry Holm, four miles away. *S. procumbens, Spergularia marginata. Malva sylvestris*, several plants in two or three spots on the middle "island"; and occurring on other very out-of-the-way cliff-tops, *e.g.* at Mewslade Bay, near Port Eynon, as well as at Southerndown. As native, no doubt, as the *Lavatera* which accompanies it, on inaccessible rock faces in Mewslade Bay. *Linum catharticum, Geranium sanguineum, molle, Robertianum, Erodium cicutarium*, and *E. maritimum*, the latter in great quantity, sometimes forming an exclusive mat of vegetation yards across. *Ulex europæus, Anthyllis Vulneraria, Lotus corniculatus, Prunus spinosa, Rubus cæsius, Potentilla sterilis, Poterium Sanguisorba, Sedum acre, Conopodium majus, Crithmum maritimum*; *Heracleum* only on the steep side of the large "island," in one long clearly defined line, where it had the protection and support of other tallish vegetation. *Daucus Carota*, but not *D. gummifer*, which occurs in typical form at Nash Point. *Hedera*, near the *Heracleum, Asperula cynanchica, Bellis, Filago germanica, Inula crithmoides, Chrysanthemum Leucanthemum, Senecio vulgaris, S. Jacobæa, Carlina, Carduus tenuiflorus. Cnicus lanceolatus, C. arvensis*, in very limited quantity over a small area. *Centaurea Scabiosa, Hieracium Pilosella, Taraxacum officinale, Sonchus oleraceus.* The last is in the same case as *Malva sylvestris*; not uncommon on very out-of-the-way cliff-tops and faces, sometimes growing on bare rock, like the little spleenworts or *Draba aizoides. Calluna*, and the two common heaths. *Limonium binervosum* in very varying forms and sizes, dwarf plants being without the barren branches which the larger forms bear. *Statice maritima* in increasing quantity towards the end of the Head: white flowers occasionally. *Primula veris* is common and luxuriant. *Glaux* in one small patch on rocks between two of the "islands." *Anagallis arvensis*, drawn up among gorse and other vegetation, and also in smaller forms on one if not two of the "islands"; it also occurs in small plants about the cliff slopes and faces of the neighbourhood, more often among other vegetation, e.g. *Trifolium scabrum, T. striatum, Lotus*, &c. It is clearly at home there, is quite common, and by no means favours the barer spots exclusively. *Ligustrum, Centaurium umbellatum, Myosotis versicolor, Convolvulus arvensis, Veronica arvensis, officinalis*, and *Chamædrys. Euphrasia curta* var. *glabrescens, Thymus, Calamintha Acinos, Ajuga reptans, Plantago lanceolata, maritima*, and *Coronopus. Beta maritima, Atriplex deltoidea, Polygonum aviculare*, one small patch at the summit of the furthest "island," in one of the common forms, not var. *litorale, Rumex crispus, R. Acetosa, Euphorbia portlandica, Urtica dioica*, with the *Hedera* and *Heracleum, Parietaria, Scilla verna. S. non-scripta* grows in the taller vegetation on the steep side of the large "island." *Juncus conglomeratus*, *Luzula multiflora*, *Carex caryophyllea*, *C. flacca*, *Anthoxanthum*, *Aira caryophyllea* and *præcox*, *Cynosurus cristatus*, *Kœleria*, *Dactylis glomerata* var. *congesta*, *Poa annua*, *Festuca rottbœllioides*, *F. ovina*, *Bromus hordeaceus*. *Nardus* and *Pteris* grow on the heathy tops just behind the cliff edge, in quantity about Mewslade Bay and eastwards.

SIGISMUND BACSTROM, M.D.

(fl. 1770–1799.)

By James Britten, F.L.S.

In this Journal for 1905 (pp. 290–307) will be found an account of Lightfoot's Visit to Wales in 1773 which is stated to be "reproduced from Solander's transcript in the Department of Botany." The statement had generally been accepted; it had on more than one occasion been printed and had never been called in question. We in the Department had observed the handwriting elsewhere in the library and in the Herbarium, and, although it was more precise than that of Solander, it seemed possible that, when taking pains with his caligraphy, he might have been the scribe. But about the time the paper referred to was printed, doubt began to enter our minds; it will be noticed that in the account of the Banks and Solander collections which immediately precedes it (pp. 284–290) the transcript of the original Solander MS. (in the same hand) is not assigned to any writer, but is described as "by some one imperfectly acquainted with botanical terminology or unable to read the draft, as it contains numerous errors," and we had begun to refer to the writer as "the clerk." It was not very long after this that, turning over the portion of the Banksian correspondence preserved at Kew, my eye fell upon a letter undoubtedly in the characteristic handwriting of "the clerk," and his name was revealed as Sigismund Bacstrom. Further letters showed him to have been employed by Banks in the work of his herbarium, and, as everything connected with that national possesion is of interest, I determined to put together what could be ascertained concerning him. This determination I now propose to put into practice, facilities having been courteously placed at my disposal by the authorities at Kew for the transcription of the more interesting portions of the letters, of which seven are preserved in the Banksian correspondence.

Of Bacstrom himself little is known apart from the letters. His name suggests a Swedish or Danish nationality, and it may be that Solander, himself a Swede, introduced him to Banks, by whom he was employed in 1772. Such details as are known of his life can be obtained from the letters, which show him as a man of varied interests and accomplishments, although his career during the thirty years of which we have knowledge cannot be deemed a successful one. He wrote English perfectly in a neat well-formed round hand; his letters, if, as was natural from his position, somewhat insistent as to his necessities, are, as will be seen, interesting, and the last of them gives a vivid picture of the dangers incident upon sea-travel at that period.

In the first letter, dated June 28, 1786, and written from "Mary Le Bone" where he lived when in London, Bacstrom refers to his former employment by Banks and asks for a renewal of his protection. He had been six voyages as surgeon to as many different merchant ships since 1779—four to Greenland, one to the Guinea Coast, and one to Jamaica. In Jamaica he was obliged by illness to stay for five months, during three of which he was blind; he returned to England as surgeon to the *Trelawny*, a Bristol ship, and "after a long voyage full of misery, distress, and sufferings, brought but 20 guineas to London." After this he went twice again to Greenland, and was very nearly shipwrecked. At the time of writing he says, "I can get no voyage except to Greenland, as no merchant ships carry a surgeon except the Guinea men, where I suffered so much that the remembrance of it makes me shudder." He then enumerates his qualifications for "tutor to one or two young gentlemen or to travel with a gentleman either by sea or land," or to "attend an infirm gentleman," though he does not "pretend to be an experienced surgeon"; or to assist in chemical experiments—"I do not mean the Lapis Philosophorum seu potius Insanorum"—as he knows a "good deal of the true theory of the science and something of the practice"; and suggests that Sir Joseph might obtain for him employment by the Duke of Northumberland, who "is a lover of chemical philosophy"; he is also prepared "to teach his Grace how to procure a more than usual encrease of fertility in vegetation by means of proper natural magnets which powerfully attract the fertility (which is a nitrous acid) from above. I believe I could get a little fortune with it, if it was in my power to make experiments at my own expense; the farmers would pay very handsomely for the knowledge, after they had seen the truth of it. I made 2 experiments on a wine tree at Paddington since 2 years; last autumn the wine tree was loaded with grapes and very large bunches and berries, whilst the neighbours had scarcely any, and this year the wine tree is loaded again; the same can be done with corn, wheat, rye, &c. It will not succeed every year, but then without this method, it will fail also, if heavy rains or too great draughts should hinder the operations of nature."

To this letter Banks sent a "friendly" reply, which Bacstrom acknowledges on Aug. 21. He then thought of applying for employment to Count Cagliostro, who, when in Strasburg, he had heard "was very kind and charitable to such as were most in need of it; besides curing the sick gratis, he generously assisted many of them who were in distress. According to what I have heard, the Count is a man of great learning and behaves kindly to those that wish to acquire knowledge." He thinks that Cagliostro "might perhaps take [him] into his service; as he does not understand the English language he must be at some loss here," and asks Banks for "a letter or verbal recommendation" to the Count.

On Sept. 26 of the same year, Bacstrom writes at length as to a proposal of the Government "to transport the convicts to the coast of New Holland," where "they mean to build a little fort and establish a kind of colony." He thought he might go out with the two frigates which were to be sent to arrange things there, returning with them when things were settled, and in the interval collecting "plants, seeds, shells, minerals, or whatever [he] could meet with." He enters into details as to his proposed mineralogical investigations, and continues, "Though I am but a very poor botanist, yet I c^d collect whatever I c^d get, plants and seeds; I c^d make shift to make a tolerable sketch* of a plant relative to colours and shape, tho' not botanically true, yet the dried specimens brought home, and the seed raised afterwards in a hot house in England w^d ascertain the character and compleat what I had imperfectly delineated."

This plan like others apparently came to nothing. The next we hear of Bacstrom is in his letter dated June 15, 1791, from which we learn that in 1786 he "became acquainted with a gentleman who was a lover of chymical experiments for the sake of making useful discoveries in natural subjects, who placed me in the house where I live at present [2 Paradise Place, Marylebone], who enabled me by his generous assistance to establish a compendious and convenient laboratory, which has cost £200, and then allowed me £150 a year for making chymical experiments, for rent, taxes, our living, &c., all included." This kept Bacstrom employed until 1789, but in September of that year his patron died; "to my great misfortune he was behindhand with me for his last quarterly payment, and left me indebted above £30, with only 5 shill: in the house. Since that time I have struggled on. I have practised physic, and performed some good cures, but among people of no note. But my practice is insufficient to support me, as I cannot depend upon one guinea a month." He adds that his wife had "waited on General Rainsford, who proposed that a subscription might be raised with Sir Joseph's approbation and under his sanction." At the foot of this letter Banks has added a copy of his answer:

"As during the time you received a salary from me you always conducted yourself with integrity, I shall readily subscribe 5 guineas towards extricating you from your present distress, provided Gen. Rainsford will undertake to promote a subscription among his chemical friends to whom you are much better known than to any acquaintance of mine."

This note has reference to the appeal in the first paragraph of Bacstrom's letter, in which he refers to Banks's having formerly treated him "with so much goodness; yet where can I apply to?

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* A water-colour drawing of a whale in the Library of the Zoological Department of the Natural History Museum (dated 1786) shows that Bacstrom was a careful draughtsman.

unknown, lost, and as much a stranger as in 1772, 73, 74, 75, when I had the honour to serve you."[*] In the first of these years Bacstrom accompanied Banks on his voyage to Iceland; during the remainder he was employed in the Banksian herbarium. The principal evidences of his work as transcriber are the copies of the MSS. already mentioned relating to Banks and Solander's voyage round the world; that of Lightfoot's journey into Wales, and one or two smaller MSS.; of a certain number of the Solander MSS., bound up with them; a transcription into a copy of Ray's *Historia* of all the MS. references from Sloane's copy; and the names on some sheets of the herbarium.

We learn from an undated letter that Rainsford did not carry out his promises, and poor Bacstrom, in despair, sent his wife —he himself being "very much indisposed"—to wait upon Banks and endeavour to obtain his approval of a "memorial or petition." The result of this is not apparent, but on Aug. 18 of the same year he was appointed by two city merchants, one of whom had twice (in 1780 and 1784) employed him in the same capacity, as surgeon to a "fine ship" which was to proceed "round Cape Hoorn to the South Seas, to Nootka Sound, China and through the East Indies round the Cape of Good Hope home, consequently round the world. . . . . The intended voyage is entirely for a commercial purpose, we are to bring the Cortex peruv. and whatever valuable druggs or natural productions we can meet with that will fetch money, independent of the new furr trade between Nootka Sound and China." Bacstrom was instructed "to sollicit Sir Joseph's advice concerning plants or roots which might in future answer some commercial purpose," and asks Banks to send him "a print or drawing of the Cortex, the Rhubarb plant, the Gum Copal Tree, or of some other valuable article of the vegetable department," adding, "whatever curious things not concerning my Gentlemen I might have in my power to bring home, I will wait on you first, Sir, to offer them to you as a feeble mark of my gratitude."

Towards the expenses of the voyage Banks contributed £10, on the understanding that Bacstrom's "leisure hours" should be employed in collecting for the Banksian herbarium; this is acknowledged by Bacstrom in a letter dated Sept. 10, in which he says that he was to sail on the 1st of October.

But the misfortune which seems to have attended Bacstrom throughout that part of his life of which alone we have record did not even now desert him. The last letter in the collection, dated from Lambeth, November 18, 1796, gives an account of his expedition which it may be worth while to describe. After referring to an unanswered letter of Oct. 18, 1795, which does not appear in the correspondence and perhaps was never received, and thanking Banks for his kindness to Mrs. Bacstrom during the writer's absence, the narrative proceeds:—

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[*] A subsequent reference to his having been "in this country since 21 years" places Bacstrom's arrival in England in 1770.

"Last year I took the liberty to give you an account of my unfortunate voyage and mentioned to you that I had collected 4 large quires full of plants and mosses at Staaten Island and on the N. W. coast of America and a greater quantity of seeds, as also a boxfull of seeds from Nanking, which I had purchased at Canton; but during my long and disagreeable voyage, obliged to be in 6 different ships, taken prisoner 3 times, detained 6 months in the island Mauritius, I lost y^r valuable collection which had cost me a great deal of trouble to preserve so long.

"I was obliged to quit my first employ in Nootka Sound in the y^r 1792, on acc^t of the ill and mean usage I rec^d from Capt. W. Brown and his officers (which Capt. Brown has been murdered in the y^r 1794 by the natives of the island Oahoo) and was forced to seek for an asylum among the Spanish officers at Nootka, when Capt. W. Alder, a lieutenant in the navy, seeing me ill used undeservedly, received me on board 3 B^s. as a friend and treated me like a brother.

"I sailed with him to the Sandwich Islands back to Nootka and Norfolk Sound, and with his consent engaged myself at Nootka in the character of surgeon and supercargo on board of a snow under American colours, commanded by an Englishman. When arrived in China, near Larks Bay, we were taken by the *Lion*, an English 64 (the same which carried the English Embassador to China) and condemned as a prize, having French papers on board, whereof I was ignorant. I lost 200 Spanish dollars. I obtained immediately my liberty and went to Macao, where I was engaged by Mr. Charles Schneider, son to J. H. Schneider, Esq., No. 18 Beer Lane, who had then bought the *Warren Hastings* East India Country (*sic*) ship of 600 ton, as surgeon, for 40 Sp. dollars p^r month. Capt. Schneider had the impudence to engage a French capt. for his chief mate, who shipped 22 French seamen, several Spaniards, Portugeese, Italians, 13 different nations. We were bound for the Cape of Good Hope and Oostende, under Genoese colours.

"Coming n^r the Isle of Bourbon, our chief mate, with French, Spanish and Portugeese crew, revolted and took the ship with the cargo, confined us as prisoners and carried us to the Isle of France or Mauritius, where ship and cargo was condemned, being proved Dutch and English property.

"After 6 months residence in that island, I obtained liberty to go to New York with an American vessel; I was obliged to pay 300 dollars for my passage.

"When arrived before the lighthouse off New York, a gale, which blew most violently during 3 weeks, drove us from the American coast, and we were forced to go back to the Island St. Thomas; leaving that island we were taken by the *Inspector* sloop of war, carried into Tortola, and condemned there as a prize, our cargo being proved French property.

"The Hon^ble George Leonard, President and Judge of the Admiralty, who acts as Governor of the Virgin Islands, took me under his protection; I lodged with him in the country 6 weeks and he p^{d} my passage home to England, where I arrived after an absence of 3 years and 8 months, on the 23 of July last. During this long and tedious voyage I made as many sketches and drawings as I could in hopes of reaping some benefit from them at my return, which was very uncertain. If you will permit me, Sir Joseph, to have the honour to shew them to you, I shall be very happy; I propose to copy my sketches in more finished style.

"During this unfortunate voyage, to drive away melancholy thoughts and keep myself as chearful as times and circumstances w^{d} permit when I had no opportunity to collect plants or to draw, I passed time away in uniting my thoughts into a kind of system, what I had learned and studied since many years and what I believe to be true and rational.

"These ideas were the basis of a treatise I put into some kind of order since my return finished and improved my frontispiece drawing, which I first conceived and invented at sea on board of the American snow *Amelia.*

"I wish to publish this treatise by Subscription in hopes to earn a little money with it. Since 8 years I have applied myself to the study of the Hebrew for the sake of comprehending the curious scientific allegories in the Old Testament. Although the general contents of my treatise do not concern your favourite studies, yet on the other hand I am so well convinced by unmerited favours of your goodness towards me that I humbly presume to send you here inclosed 4 proposals, intreating you to honour me with y^{r} name as a subscriber and to procure me a few subscribers among your friends. . . . If you like, Sir, to see and read the manuscript first before you subscribe you will do me much honour. It may not in every line coincide with your ideas, but I am well persuaded that you will find in it nothing in it that is against God, against morality, against Nature, against Government, nor against common sense, nor will you find any contradiction therein."

There is no further reference to Bacstrom in the Banksian correspondence, but we get one more glimpse of him in 1799, in which year he published in the *Philosophical Magazine* for July a detailed "Account of a [Whaling] Voyage to Spitzbergen in the year 1780," "extracted from a journal which [he] kept at the time." This is reprinted in the first volume of Pinkerton's *Collection of Voyages and Travels* (1808), where it occupies seven pages (614–620). From this narrative of the second of his voyages we learn that at the time of writing Bacstrom had been "no less than fifteen," from which it is apparent that he continued this mode of livelihood after his unfortunate voyage round the world. It is from the heading of this paper, which is written in an interesting and lively style, that we learn that Bacstrom had taken the degree of M.D. The vessel, the *Rising Sun*, left London at the latter end of March and arrived home about the latter end of August.

SHORT NOTES.

Digitalis purpurea Linn. in East Leicestershire.—Whilst engaged in botanical survey work a few weeks ago, Father Reader and I made the initial discovery of this plant in East Leicestershire on a commanding eminence, a landmark well-known to all hunting men in this shire as Carlton Curlieu, near Kilworth. It is, moreover, an enclosed covert which contains several fox "earths," and is capped by sandy gravel or chalky boulder clay. The plants, of which several were seen, were growing in the centre of a big grass pasture district, where there is little chance of their having been introduced in the usual way. Though it is possible the seeds may have been conveyed to this isolated station by birds from the nearest locality west of the Soar, Groby (ten miles away), I think it is more than probable that they have been carried by foxes, the seeds having been pressed into the "pads" with soft earth, and probably subsequently loosened in the coppice by the fox in clearing its feet after a long "run" or possibly a midnight adventure in search of poultry. Darwin (*Origin of Species*) has referred to the transport of seeds by duck, adhering to mud, &c. A. Wallis Kew (*Dispersal of Shells*) speaks of cases in which shells have been transported by mammals, suggesting their transportal by others (p. 50), and (*ibid.* p. 155) instances the case of a rat clearing off an armful of snails from a hollyhock. Miss Warre suggested to him the transportal of small shells by means of cattle, to whose hoofs they might stick with the mud. Clement Reid (*Origin of the British Flora*) also alludes to the ways in which mammals may transport seeds, either when eaten or clinging to the fur, or carried on the legs of animals, adhering to their flanks or heads, or by the falling of the animal over a cliff and subsequent drifting of its dead body. Other writers have referred to the possibility of dispersal by these and other means, so that it is not new, but the specific case of a fox carrying seeds in its pads has not, I believe, been alluded to so far, and the probability here seems irresistible. For the interest in the occurrence of so generally common a plant lies in the fact that hitherto it had not been met with or but rarely in v.-c. 55, east of the Soar Valley, though common on the west side of the county (vide *Flora of Leicestershire*). We have not ourselves seen it before in East Leicestershire.—A. R. Horwood.

Worcestershire Plants.—The following plants have not been recorded for the Malvern district of Worcestershire, and those marked with an asterisk are also new to the county:—**Hypericum humifusum* Linn. var. *magnum* Bast. This appears to be the usual plant in the neighbourhood of the Malvern Hills.—*Malva moschata* Linn. var. *heterophylla* Lej. Malvern Wells.—**Medicago lupulina* Linn. var. *scabra* Gray. More frequent than the glandular var. *Willdenowii* Koch. and very much more abundant than the type. Malvern and Malvern Wells.—**Trifolium procumbens* Linn. var. *majus* Koch. Leigh; *Mrs. C. Urquhart Stewart.*—**Crepis capillaris* Wallr. var. *diffusa* (DC.). Abundant on the hills and on the commons at their bases. A frequent hedgebank plant.—*Chenopodium urbicum* Linn. var. *intermedium* Moq. Malvern Wells.—**C. capitatum* Asch. var. *virgatum* (L.). Malvern Wells.—**Polygonum minus* × *Hydropiper* = *subglandulosum* Borb. Growing with both parents on Castlemorton Common. —**Orchis ericetorum* Linton. Malvern Link.—**O. ericetorum* × *maculata*. Malvern Link.—**Habenaria viridis* Br. var. *bracteata* A. Gray. Sherridge; *Mrs. C. Urquhart Stewart*. Little Malvern.—*Juncus bufonius* Linn. var. *fasciculatus* (Bert.). Malvern Wells.—**Carex Goodenowii* Gay, var. *juncella* (Fr.). Castlemorton Common.—**Brachypodium pinnatum* Beauv. var. *pubescens* Gray. Little Malvern.—**Lolium perenne* Linn. var. *tenue* Syme. Malvern Wells. —**L. perenne* Linn. var. *sphærostachyum* Masters, Powick. Malvern Wells.—RICHARD F. TOWNDROW.

RUMEX ELONGATUS × OBTUSIFOLIUS.—A tall-growing narrow-leaved Dock attracted my attention, last year, along the river-wall between Putney and Barnes, Surrey. When I was able to collect examples, in late July, it was mostly past flower and fruit. There was something peculiar-looking about the specimens that led me to think that I had here a *R. Hydrolapathum* hybrid, but further study inclined me to the belief that the characters I at first ascribed to the influence of *R. Hydrolapathum* were really derived from *R. elongatus* Guss. The Rev. E. F. Linton, who has recently seen my specimens, agrees with me as to the hybrid being *R. elongatus* × *obtusifolius*. Whilst the related hybrid *R. crispus* × *obtusifolius* is of common occurrence, I do not think the subject of this note has before been found in this country. *R. elongatus* still grows by the Thames near Putney, where it was noted many years ago, and also higher up the river between Mortlake and Kew.—C. E. BRITTON.

A CORRECTION.—Canon Lett states in his notice of Mr. Macvicar's "Distribution of Hepaticæ in Scotland" (p. 37) that the volume lacks an index. As such index is a very obvious feature of the work in question, it is difficult to understand how anyone who had even glanced through it could have referred to its absence.—C. E. LARTER.

REVIEWS.

Plant Anatomy from the Standpoint of the Development and Functions of the Tissues, and Handbook of Microtechnic. By WILLIAM CHASE STEVENS. Second Edition, revised and enlarged. 8vo, pp. xv. 379, tt. 152. London: Churchill. 1910. Price 10*s.* 6*d.* net.

THOUGH published by a London firm, this book is printed in America, and the author is Professor of Botany in the University of Kansas. None the less it is a text-book which should be useful to teachers and students of botany in this country, as the subject is treated in a manner somewhat different from the methods generally adopted in our text-books. The motive of the work is the presentation of the details of plant structure in relation especially to the functions performed—plant anatomy from a biological point of view. To quote from the author's preface—"the book attempts to point out in a brief and elementary way how plants arrive at the existing correlation of structure with environment by the evolution of the different physiological tissue-systems from a primitive undifferentiated embryonic tissue, and how the tissue-systems are adapted by their character and relation to each other to carry out the plant's vegetative functions."

The first three chapters are devoted respectively to the Plant-cell, Differentiation of Tissues, and Secondary Increase in Thickness, and give a good account of the general principles underlying plant-structure. Chapter iv., with the title "Protection from Injuries and Loss of Water," deals with the epidermis, cork formation, and other means of protection; while chapter v., the Plant Skeleton, is concerned with the mechanical tissue. By use of a comparative method the author is able to emphasize the meaning of the structures concerned. Thus a comparison, with illustrative figures, of the epidermis of leaves from plants growing under various conditions of illumination, or with different facilities for absorption of water, brings out an important function of the epidermis as a protective layer. The next eight chapters deal with the anatomy and histology of the plants from the points of view of their various physiological functions, namely, Absorption of Water and Minerals, Transport of Water and Soil Solutes, Intake and Distribution of Gases, Construction of the Plant's Food, Transport of Foods throughout the Plants, Storage of Food and Water, Secretion and Excretion, and, finally, Reproduction. The last-mentioned chapter contains a short account of "Mendelism" and its relation to heredity, illustrated by some helpful diagrammatic figures. Chapter xiv. is devoted to instructions for preparation of sections by various methods and processes of staining and mounting, and chapter xv. to the Use of the Microscope, with directions for drawing by means of the *camera lucida*, &c. In chapter xvi., Reagents and Processes, is a description in alphabetical order of a large number of reagents and processes, such as clearing, dehydration, and others. Chapter xvii. is a similarly arranged account of the microchemistry of plant products, while the last chapter—xviii.—deals with Detection of Adulterations in Foods and Drugs.

The book is nicely and clearly printed, and the illustrations are numerous and helpful. Many of these are original, and special reference should be made to the diagrammatic figures, of which the author is very fond, and by which he demonstrates graphically such matters as transport of water through the plant, relation of the leaf to the conducting tissue, relative development of protective tissue in various parts of the plant, and the function of the stomata in relation to its forms. In many of the figures, by the use of three dimensions, a much clearer idea is given than by the more usual plan of showing one surface only.

A. B. R.

Tennyson as a Student and Poet of Nature. By Sir NORMAN LOCKYER and WINIFRED LOCKYER. 8vo, cl. pp. x. 220. Macmillan. Price 4*s*. 6*d*. net.

THE "minute accuracy of observation displayed" by Tennyson, to which Sir Norman Lockyer refers in the concluding paragraph of his introduction to the volume before us, is obvious to every nature-lover who reads his poems, and was still more evident to those who had the privilege of accompanying him in his walks at Freshwater, or, later, in strolls round his garden at Aldworth. And it was perhaps worth while "to collect together the passages in Tennyson's works which deal with the scientific aspects of nature," as has to a certain extent been done in the volume before us, which by liberal spacing has been expanded into 230 pages, and should have had another ten in the shape of an index, which is unaccountably wanting. But having looked through the portion connected with "plants and trees," with which alone we are concerned, we find it impossible to ascertain on what principle the selections have been made.

That the compilers have not intended to give a complete anthology is obvious enough—dozens of omitted passages recur to the reader as he glances through those selected, which seem at least equally worthy of inclusion. "The scientific aspects of nature" are surely at least as much present in the reference to "those long mosses in the stream" or "the violet of his native land" as in "all Lent-lily in hue" or "native hazels tassel-hung," both of which are included. If

"The moving whisper of huge trees that branched
And blossom'd in the zenith,"

which does not refer to England, be cited under the heading of Spring, why exclude

"The wild marsh-marigold shines like fire in swamps and hollows grey"

which does? Nor do we understand why such verses as that beginning "The slender acacia" should be placed under Spring; the context, as indeed do the other flowers mentioned, makes it obvious that the poet was describing summer, not spring; and in any case, what is there "scientific" in the passage?

It would be easy to amplify on these lines, but other matters provoke remark. Various eminent scientific men are thanked for their assistance, and manifestations of gratitude are always pleasing; but surely it did not need Prof. Farmer to tell us that

"When rosy plumelets tuft the larch"

refers "to the young cones that are rosy-red in colour"—"who's a deniging of it?" one is inclined to say. With Colonel Prain's notes we are frequently out of accord. We will allow that "creepers crimsoning to the pinnacles" may be "*Parthenocissus tricuspidata*, more usually but incorrectly known as *Ampelopsis Veitchii*," though we think it more likely that the common "Virginia Creeper" was intended; but it seems almost sacrilegious to assign "the little speedwell's darling blue" to *Veronica Buxbaumii*, an introduced cornfield weed which, *pace* Colonel Prain, is by no means "the most brightly blue-flowered of the smaller speedwells," its blossoms containing as they do a considerable proportion of white. The reference of course is to *V. Chamædrys*, which is also hinted at in "a clear germander-eye," as Col. Prain allows, though he goes into a discussion to show that "the true germanders" are Teucriums, none of which are blue, nor "have a flower that can be likened to an eye." Again, under "the flower that closes on the fly," Col. Prain gives us a disquisition on *Silene nutans* and on insectivorous plants, of which "the influorescence (*sic*) imprison (*sic*) flies," but *doesn't* close upon them, and winds up with the statement, "the Sundews, if insectivorous plants are intended, may well have been in the poet's mind, since these *do* 'close upon the fly,' but with their leaves, not with their flowers." Can anyone doubt that Tennyson here used "flower" for the whole plant, as in "Flower in the crannied wall"? or

> "Up there came a flower
> The people said, a weed."

By the way, the compilers say of *The Flower*: "If these [verses] did not in the poet's mind refer to natural study on Darwin's lines, they are so applicable to that theme as to afford a wonderful example of Tennyson's concern with natural processes." We confess our inability to perceive the special applicability of this "universal apologue," as the poet called it, to the Darwinian theory, and as the verses were published in 1847 they can scarcely have referred to it.

Colonel Prain seems hardly to have understood the requirements of a book of this kind, and the compilers have allowed him to divagate somewhat at length; thus when Tennyson refers to "the whitening sloe," the commentator tells us that "the blackthorn sometimes goes by the name of sloe-tree, and Tennyson was evidently calling it by that name here and alluding to the blossoms"; there are other notes equally obvious in character.

It may be added that while many of the quotations bear little or no allusion to "scientific aspects of nature," others which have such reference are not duly classified: thus

> "The white lake-blossom fell into the lake,
> The pimpernel dozed on the lea"

should clearly be headed "the sleep of flowers," and it may not be obvious to all that by the "lake-blossom" is intended the white water-lily.

From this it will be manifest that in our judgement the idea of the book, so far as plants are concerned, is better than its execution.

Plant-Animals; a Study in Symbiosis. By Frederick Keeble, Sc.D. Cambridge, at the University Press. Price 1*s*. net.

The title of this work is to some extent a misnomer. One would *a priori* suppose that a shilling treatise on so wide a subject as symbiosis would, for mere want of space, be restricted to a recapitulation of the chief facts brought to light by observers in this field of study. Professor Keeble has, however, done much better than that. The series of volumes, to which the present is a notable addition, has been designed by the Syndics of the Cambridge University Press not to meet the needs, already so well catered for, of beginners, but to present in a compact form the results of literary and scientific research to educated readers, through the medium of writers conversant, at first hand, with the subjects respectively entrusted to them. To Professor Keeble has therefore fallen the congenial task of producing what is really a monograph of two Turbellarian worms, *Convoluta roskoffensis* and *C. paradoxa*, animals containing coloured cells which, by their powers of photosynthesis, take a share in providing nutritive materials for the worms in question. Having himself borne a leading part in the study of *Convoluta*, and endowed with the capacity of clear exposition wedded to much felicity of phrasing, the monograph bears a double warrant, namely of authority and of literary grace. The relations of the worms to their respective environments, their geotropism, phototropism, nutrition, &c., are all explained in a way that no intelligent person can possibly misapprehend. Particularly interesting to botanists is the account of the discovery, the author's own, of the Chlamydomonadineous alga which furnishes the green cells of *C. roskoffensis*, a discovery crowned by brilliant success after much painstaking effort. Readers of this Journal, if they wish to give themselves an intellectual treat at almost nominal cost, cannot do better than get a copy of this cleverly written little book.

S. M.

BOOK-NOTES, NEWS, &c.

We are glad to learn from the January number of the *Selborne Magazine* that the Selborne Society has decided to take up the question of the protection of British plants. It has always been a matter of surprise to us that this matter has been almost entirely neglected by the Society, although attention was more than once called to it by a former editor of the Society's magazine, and we can only hope that the saying "better late than never" may find its fulfilment in this case. A section of the Society, of which Dr. Rendle is the president and Mr. A. R. Horwood, of the Leicester Museum, the recorder, has been formed to take up the matter, and the latter will be glad to receive offers of coöperation. We hope that the Society will at the same time take proper steps to call attention to the general practice of leaving hedgebank-scrapings and hedge-clippings to accumulate on grassy roadsides, and to the throwing-up of road sweepings upon hedgebanks, to the destruction of vegetation and the uglification of the countryside.

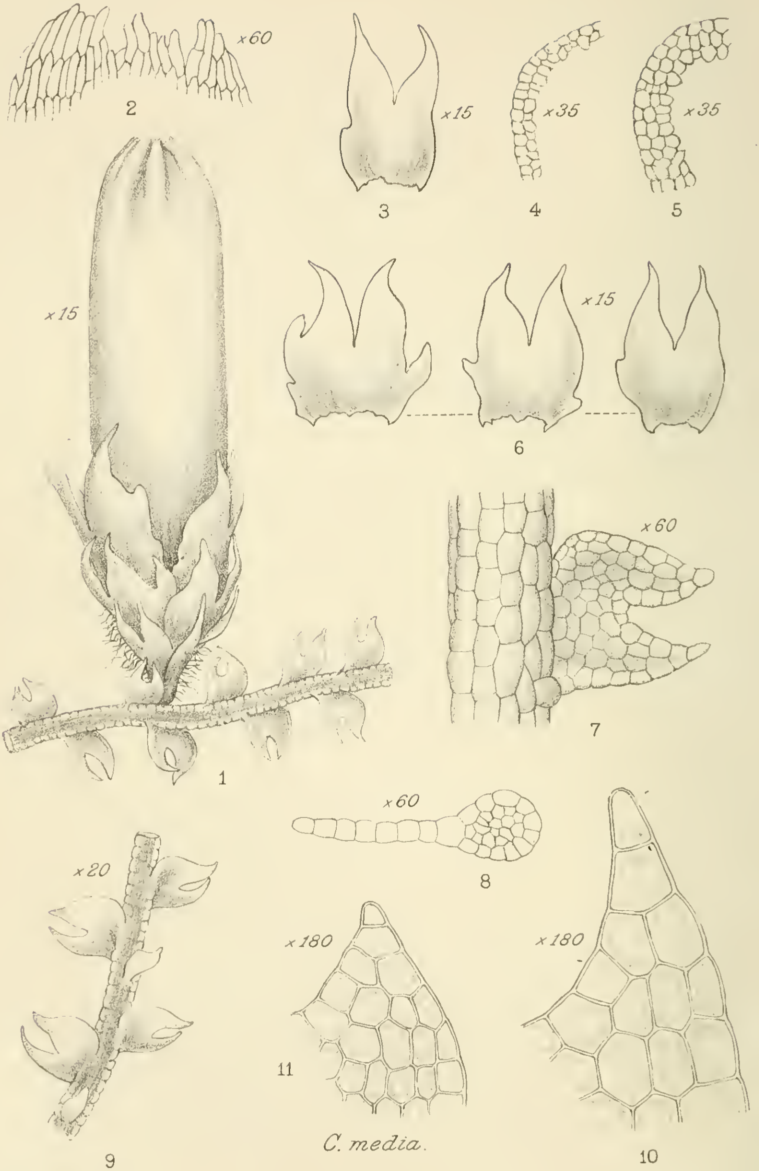
How large and ready a welcome has been accorded to Mr. T. H. Russell's introduction to the study of the *Mosses and Liverworts*

(London, Sampson Low & Co., new and revised edition, pp. xvi. 11 plates, price 4*s.* 6*d.* net) is rendered evident by the fact that the first edition, which appeared in May, 1908, is already exhausted. The present issue has afforded the author an opportunity for making some alterations and additions. Four entirely new plates have been added, and plate 1 of the old edition is omitted. The terminology is improved in so far as the words "reproductive organs" are employed in place of the inaccurate expression "flowers." But it is a pity that the long-winded and artificial English names are still retained; they are twice or thrice as long as the Latin binomial, are less accurate, and do not prepare the student for the terminology employed in bryological works. It is only fair to add that the Latin binomial is always given alongside the English name, but being in brackets it is less prominent and is liable to be neglected. The plan of the book is as follows. An account in popular language is given of the main facts of the life-history of the bryophytes and of their various modes of reproduction. The collection, examination, and preservation of specimens is duly discussed; and the best sort of apparatus for use in this is described, indications for its home-manufacture being added. Explicit instructions for the preparation of microscope-slides are given, and hints for the avoidance of the many pitfalls which beset the tyro.—A. G.

We are glad to see that Mr. J. Medley Wood of the Natal Garden is continuing his useful series of illustrations of *Natal Plants*, which has now reached the second part of the sixth volume. Although from the point of view of those at home it might be wished that a larger proportion of the plates represented species hitherto unfigured, the primary object of the work is of course to help South African botanists and collectors, and for this it is admirably adapted. The plates in this instalment show a distinct improvement on those of earlier portions of the work.

At the request of the Cotteswold Club, the Rev. H. J. Riddelsdell has begun to compile material for an eventual Flora of the County of Gloucester. The project is of long standing, but has been in abeyance because the botanists who began work on it have in turn been called away to work which left them no leisure for such a task. It would be of great assistance if the interest of all botanists could be enlisted, so far as their opportunities go. Communications (1) of herbarium records, (2) names of books and other sources of information, (3) any items of personal knowledge, would be gratefully received by the Rev. H. J. Riddelsdell, Old Registry, Llandaff.

Prof. V. H. Blackman, who has since 1907 occupied the Chair of Botany in the University of Leeds, has been appointed Professor of Plant Physiology and Pathology at the Imperial College of Science.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9
×180
11
×180
10
C. media.

H. G. Jameson del.
P. Highley lith.
West, Newman imp.

Cephalozia macrantha *Kaal. & Nicholson.*

CEPHALOZIA MACRANTHA KAAL. & NICHOLSON, NOV. SP.

AUCTORE B. KAALAAS.

(PLATE 512.)

Dioica, majuscula, laxe cæspitosa vel supra muscos repens, pallide-viridis—albescens, 1–1·5 cm. longa et cum foliis 1·2 mm. lata, eflagellifera, stolones breves autem hic illic emittens.

Caulis prostratus, radicellis crebris hyalinis vel fuscescentibus repens, parce ramosus, ca. 1·6–2 mm. in diam.; cellulæ corticales magnæ, pellucidæ, breviter rectangulares, 8–10 seriatæ.

Folia caulis ramorumque sterilium distantia, haud contigua, parum oblique—fere longitudinaliter affixa, antice parum vel vix decurrentia, patula vel interdum ad anticum vergentia, leniter concava—subplana, 0·44–0·49 mm. longa et 0·49–0·57 mm. lata, e basi angustiore suborbiculata—oblique rotundato-quadrata, ad $\frac{1}{3}$–$\frac{2}{5}$ incisa, sinu pro more angusto, rarius latiore, obtuso vel acuto, segmentis acutiusculis vel obtusiusculis, apice incurvis, rarius conniventibus, pro more inæqualibus, segmento dorsale distincte minore et angustiore.

Cellulæ folii sat magnæ, hexagonæ—quadratæ, parce chlorophylliferæ, valde pellucidæ, tenui-membranaceæ, sine trigona, 49–77 μ longæ et 28–49 μ latæ; cuticula lævis.

Amphigastria rara, hic illic tamen obvia, parva, lanceolata—subulata.

Perianthium in ramis sat elongatis valde radiculosis terminale, magnum, ad 4·55 mm. longum et 1·26 mm. latum, e basi leniter curvato elongato-ovatum, adultum teres, apicem versus solum trigonum et plicatum, ore paulum constricto truncato vel subdenticulato, haud setuloso, superne uni-, medio bi-, basi tristratum, cellulis elongato-rectangularibus, 84–112 μ longis et 23–24 μ latis; calyptra carnosa; archegonia ad 10.

Bracteæ perichætii trijugæ, intimæ magnæ, usque ad 1·9 mm. longæ, ad $\frac{1}{2}$ vel ultra 2–3-fidæ, segmentis lanceolatis, acutis, integerrimis, marginibus sæpe magno dente versus basin præditis; bracteola intima bracteis æquimagna, bifida, integra.

Plantæ masculæ plantas femineas intermixtæ. Andrœcia medium rami vel ramum totum tenentia, multijuga; bracteæ foliis paulum latiores et concaviores, bifidæ, lobo dorsale incurvo. Antheridia solitaria.

Cetera desunt.

Hab. In palude inter *Sphagna* prope Broadstone Warren, Ashdown Forest, provincia Sussexiæ, Angliæ, ubi clar. *W. E. Nicholson* mense Junio 1908 legit.

Hæc species nova *Cephaloziæ mediæ* Lindb. (= *C. lunulæfoliæ* Dum.?) valde similis, differt autem ab hac magnitudine plantæ præsentia crebriore amphigastriorum, cellulis foliorum multo majoribus et præcipue perianthio magno et ideo certe species distincta.

Explanation of Plate 512.

1. Part of plant with perianth, antical view. 2. Part of mouth of perianth. 3. Innermost bracteole. 4. Section of perianth at middle. 5. Section of perianth below middle. 6. Innermost bracts. 7. Part of stem with leaf. 8. Section of stem and leaf. 9. Postical view of stem, showing under leaves. 10. Cells of (antical) leaf-segment. 11. Cells of leaf of *C. media* (*lunulæfolia*) for comparison.

CRAIBIA, A NEW GENUS OF *LEGUMINOSÆ*.

By S. T. Dunn, B.A. F.L.S.

In Engl. Jahrb. xxx. (1901) 88 Dr. Harms described a series of specimens collected by Scheffler in German East Africa as a new genus, *Schefflerodendron.* With these he associated an Angolan species described by Taubert as *Millettia adenopetala* (Engl. Jahrb. xxiii. (1896) 184). As thus constituted his genus comprised two species closely connected by numerous conspicuous characters, among which was the presence on their leaves and flowers of peculiar brown glands. In the herbaria of Kew and the British Museum there are a number of undetermined specimens of trees from various parts of Tropical Africa which are nearly related to the genus, having single or alternate glabrous reticulate leaflets, peculiar globular buds, racemose inflorescences more or less clothed with stiff orange-coloured hairs, calyces with four triangular teeth, one emarginate, standard broadly ovate, short-clawed, ovary sessile, 4–5-ovulate. In spite of the slight differences all these are clearly members of a well-defined group, and to it must also be added three species already described under *Dalbergia*, *Lonchocarpus*, and *Millettia* respectively.

It was at first supposed that it was simply an eglanduiar section of Dr. Harms's genus, but on inspection of authentic specimens with which he courteously supplied the writer, it became evident that the two groups differed too much in floral characters, and especially in the structure of the ovary (a character of considerable importance in this part of the *Leguminosæ*), to be able to be placed conveniently in one genus. Dr. Harms had already (Engl. Jahrb. xlv. 313) drawn attention to the relations between some of these species and to their doubtful systematic position. After a careful review, therefore, of the material, he and the writer agreed to found upon it a new genus and to name it after their mutual friend Mr. Craib, of the Kew Herbarium staff, as an appropriate acknowledgement of the assistance which they have from time to time derived from herbarium material upon which he has worked in that Natural Order.

This interesting genus, which contains several trees described by collectors as exceptionally beautiful when in full flower, now comprises nine species which are enumerated below, with a key and descriptions of those hitherto undescribed.

I am much indebted to the Director of the Royal Botanic Gardens, Kew, and to the Keeper of the Botanical Department of the British Museum (Natural History), for the facilities which they have courteously granted me for the study of the material referred to in the herbaria of their respective establishments.

Craibia Harms et Dunn, gen. nov. Calycis lati dentes breves, 2 superiores semper alte connati. Vexilli lamina rotundata, rarius basi utrinque paullo inflexa, ungue brevi; alæ oblongæ, basi in latere superiore sagittatæ; carina incurva alis similis. Stamen vexillare sæpius liberum. Ovarium sessile, 2–5-ovulatum, disco nullo; stylus teres inflexus, stigmate parvo capitato. Legumen ovatum compressum mox dehiscens, valvis rigide coriaceis. Semina, 1–2.

Arbores. Folia unifoliata vel imparipinnata. Foliola exstipellata, alterna, glabra, reticulata. Alabastrorum globularium squamæ cucullatæ. Racemi terminales vel nonnulli axillares, vel paniculati, plus minus pilis aurantiacis vestiti. Flores sæpe albi, petala sæpissime glabra.

The affinities of the genus are with *Millettia*, from which it is distinguished by its alternate-pinnate or unifoliolate leaves; with *Schefflerodendron*, which is separated by its stipitate ovaries, and with *Lonchocarpus*, which has very different pods.

Key to Species.

Leaves simple	1. *C. simplex.*
Leaves 3- or more-foliate.	
Stipules persistent.	
Pedicels less than half the flower .	2. *C. Zimmermannii.*
Pedicels and flowers about equal .	3. *C. brevicaudata.*
Stipules caducous.	
Ovary pubescent throughout.	
Ovary tomentose, flowers paniculate	4. *C. atlantica.*
Ovary silky, flowers racemose.	
Leaves 3–5-foliate, under 15 cm. long	5. *C. Ellioti.*
Leaves 7-foliate, 30 cm. long .	6. *C. Brownii.*
Ovary glabrous, at least in upper half.	
Calyx sessile between the bracteoles.	
Pedicel nearly equal to the flower, bracteoles caducous .	7. *C. filipes.*
Pedicel about half the flower, bracteoles persistent . .	8. *C. Baptistarum.*
Bracteoles a little distance from the flowers, petals spotted, leaflets 6–7	9. *C. crassifolia.*

1. **C. simplex** Dunn, sp. n. Frutex ? ubique glaberrimus. Alabastra globosa. Folia alterna, unifoliata, petiolo 1–3 cm. longo; foliola ovata breviter acuminata, 6–8 cm. longa, coriacea, utrinque fortiter reticulata, marginata, venis 7-paribus. Panicula terminalis, 8–10 cm. longa, ramis alternis; flores 1·8 cm. longi, in ramis racemosi, pedicellis tenuibus, 1·5–2 cm. longis, in medio bracteolatis; calyx campanulatus basi turbinatus, 7 mm. longus,

dentibus tubi partem quartam æquantibus, triangularibus; vexillum rotundatum, breviter unguiculatum, exauriculatum; stamina monadelpha, vexillari basi libero; ovarium oblanceolatum, glabrum multi-ovulatum, stigma parvo terminali.

W. Trop. Afr. Old Calabar, *Milne*, 1866, Herb. Brit. Mus.

In this remarkably homogeneous genus this species is a little divergent in its unifoliate leaves, paniculate flowers, and ovules more than four in number.

2. C. Zimmermannii Harms, nom. nov. *Lonchocarpus Zimmermannii* Harms in Engl. Jahrb. xlv. 312.

3. C. brevicaudata Dunn, nom. nov. *Dalbergia brevicaudata* Vatke; in Oestr. Bot. Zeitschr. xxviii. 264. *Lonchocarpus deguelioides* Harms, *l.c.* xxvi. 300.

E. Trop. Afr. Ribe, *Wakefield*; Giryama and Teimba Mts., *Taylor*; Brit. Centr. Afr. *Cameron*. n. 156; Zanzibar, Mombasa Is., *Hildebrandt*, n. 1833.

4. **C. atlantica** Dunn, sp. n. Arbor parva; cortex griseus; ramuli striati. Folia 3–5-foliolata, 15 cm. longa, exstipulata; foliola alterna vel in foliis superioribus trifoliolatis opposita, elliptica, acuminata, 9–10 cm. longa, chartacea, glabra, basi acuta vel obtusa, venis reticulatis, petiolulis 5 mm. longis. Paniculæ terminales, 10–20 cm. longæ; flores racemose dispositi, 12 mm. longi, bracteolis caducis, pedicellis 5–7 mm. longis, cum pedunculis calycibusque tomento aureo vestitis; calyx campanulatus, dentibus latis brevibus, 3 mm. longus; vexillum orbiculare basi breviter acuminatum; stamen vexillare liberum; ovarium ad apicem laxe tomentosum, 4-ovulatum; legumen obovatum, lignosum, luteum, dehiscens, uniseminiferum, 4 cm. longum, 2–3 cm. latum.

W. Trop. Afr. Lagos, *E. Foster*, n. 19; Nigeria, *Barter*, n. 501.

5. **C. Ellioti** Dunn, sp. n. Arbor ? cortice brunneo, ramulis striatis. Folia 3–5-foliolata, 10–12 cm. longa, exstipulata; foliola alterna vel in foliis superioribus trifoliolatis sæpe opposita, elliptica, 7–8 cm. longa, acuminata, basi acuta vel obtusa, glabra, chartacea, venis 8–10-paribus, reticulatis. Flores in racemis terminalibus 8–10 cm. longis dispositi, 18–20 mm. longi, pedicellis cum pedunculis calycibusque aureo-tomentosis; calyx 6 mm. longus dentibus latis brevibus; petala paullo maculata; vexillum orbiculatum breviter unguiculatum. Ovarium dense rubro-sericeum etiam ad styli medium, 4–5-ovulatum.

E. Trop. Africa. British E. Africa, *Elliot*, nn. 348 and 161.

6. **C. Brownii** Dunn, sp. n. Arbor parva, cortice flavido-griseo. Folia 7-foliolata, 30 cm. longa; foliola alterna, ovato-oblonga, 7–12 cm. longa, chartacea, glabra, subito caudata, venis 7-paribus, reticulatis, stipulis 0. Racemi terminales 15 cm. vel longiores, rubro-tomentosi; flores 20 mm. longi, pedicello 10–12 mm. longo; calyx campanulatus, 5 mm. longus, dentibus 4, late ovatis, brevibus, braceolis 2, ovatis, 3 mm. longis, adpressis; vexillum late ovatum, breviter unguiculatum; alis carinaque

æquilongis; stamina diadelpha; ovarium ad apicem rubro-sericeum, medio 4-ovulatum.

E. Trop. Africa. Uganda, Mabira, in forest, *E. Brown*, n. 440.

7. **C. filipes** Dunn, sp. n. Arbor parva, ubique inflorescentiis rarissime tomentosis exceptis glabra; cortice griseo. Folia 15 cm. longa, 3–4-foliolata, exstipulata; foliola alterna, elliptica, 9–11 cm. longa, chartacea, apice gradatim acuminata, basi acuta vel obtusa, reticulata. Racemi terminales, penduli, rachide gracili. Flores albi, 17–18 mm. longi, pedicellis glabris 14 mm. longis; calyx glaber, 4 cm. longus, lobis latis, brevibus, 4; vexillum orbiculatum; stamina diadelpha; ovarium glabrum, 2–3-ovulatum.

E. Trop. Africa. Mozambique, Yimbite, twenty-three miles from Beira, *Sheppard*, n. 305.

This species is somewhat divergent from the rest of the genus as known at present by reason of its few ovules.

8. C. baptistarum Dunn, nom. nov. *Millettia baptistarum* Büttn. in Brandenb. Verhand. xxxii. (1890), 50.

W. Trop. Africa. Congo, *Underhill*, n. 222 (fide *Büttn.*); Angola, *Monteiro*, *Welwitsch*, nn. 1845, 1846.

Welwitsch, n. 1849, which has not the abruptly cuspidate leaflets of Büttner's species, cannot safely be referred here in the absence of flowers.

9. C. crassifolia Dunn, nom. nov. *Lonchocarpus crassifolius*, Harms in Engl. Jahrb. xxvi. (1899), 299.

E. Trop. Africa. Nyassaland, *Buchanan*, nn. 101, 622, *Sharpe*.

THE SAXIFRAGES OF YEZO AND THE KURILE ISLANDS.

By H. Takeda.

The materials used for the present paper are principally the extensive collection of Hokkaidô (*i. e.* Yezo and the Kurile Islands) plants preserved in the Herbarium of Agricultural College, Tôhoku Imperial University, Satporo, Japan, and the Abbé Faurie's collection preserved at Kew Herbarium. My own collection, though not very rich in these regions, is also consulted. With regard to Faurie's collection, Boissieu has already published an enumeration of the genus, together with other plants belonging to *Saxifragaceæ* in the *Bulletin de l'Herbier Boissier*, vol. v. (1897). He records nine species of the genus *Saxifraga* from Japan, all but one being known from the regions concerned. He included in his list *Saxifraga lycoctonifolia* Maxim., which has been referred to another genus. In the present paper I add to his enumeration three other species, one of which, based on Faurie's collection, was overlooked by Boissieu.

With regard to citation, I confine myself to some standard works on the genus and certain others concerning the regions in question. Descriptions are not given unless the plant is new or noteworthy.

1. S. SARMENTOSA Linn. fil. Suppl. p. 240. Engl. Monogr. Saxifr. p. 153. Fr. et Sav. Enum. Pl. Japon. i. p. 145. Boiss. in Bull. Boiss. v. p. 685 (1897).

Nom. Japon. Yukinoshita.

Hab. Yezo: circa Hakodate (*Albrecht*! 1861).

Obs. This species is quite common in mountainous districts and hilly places of Central and Southern Japan, and is one of the most popular plants in cultivation. If Albrecht's specimens were not taken from a garden, Kakodate is the northern limit of locality of this species. New to the flora of Hokkaidô.

2. S. CORTUSIFOLIA Sieb. & Zucc. Fl. Japon. Fam. Nat. i. n. 197. Maxim. in Bull. Acad. Imp. Sc. St. Petersb. xviii. p. 36, excl. *β*. Engl. *l. c.* p. 155. Fr. et Sav. *l. c.* Yatabe, Iconogr. Fl. Japon. i. 1, p. 11, excl. *β*, tab. 3–6. Boiss. *l. c.* Makino in Tôkyô Bot. Mag. xv. p. 12 (1901).

α typica. Makino, *l. c.*

Nom. Japon. Daimonjisô.

Hab. Yezo: loco non indicato (*Maries*!); Fukuyama, prov. Oshima (*K. Miyabe et Y. Tokubuchi*! 1890); Sasayama prope Esashi, prov. Oshima (*K. Miyabe et Y. Tokubuchi*! 1890); "montagne d'Hakodate" (*U. Faurie*! 1887); *circa Hakodate (*Albrecht*! 1861); Yoshioka-sandô, prov. Oshima (*K. Miyabe et Y. Tokubuchi*! 1890); Osatsube, prov. Oshima (*K. Miyabe*! 1890); Kawakumitôge, prov. Oshima (*Y. Tokubuchi*! 1888); insula Okushiri (*K. Miyabe et Y. Tokubuchi*! 1890); "the Aonai," ins. Okushiri (*S. Yokoyama*! 1891); Oshoro (*Y. Tokubuchi*! 1888); *"ravins des montagnes de Mombetsu" (*U. Faurie*! 1887); Takashima (*S. Hori*! 1886); "on rocks midway up the Shikaribetsu Mt." (collector? 1882); "bords de la mer à Otaru" (*U. Faurie*! 1888); Zenibako (*K. Miyabe et Y. Tokubuchi*! 1891); "presqu' ile des vulcans" (*U. Faurie*! 1886, n. 1476); "falaises d'Iwanai" (*U. Faurie*! 1891); Moiwa (*Y. Tokubuchi*!); Kataishiyama, prope Satporo (collector? 1888, 1890); ad fl. Hacham superiorem, prope Satporo (*H. Takeda*! 1908); Shoya, prov. Hidaka (*S. Hashimoto*! 1890); circa Shakupai, prope Shoya (*Y. Tokubuchi*! 1892); Samanisandô (*K. Miyabe*! 1884; *Y. Tokubuchi*! 1892); Horoidzumi (*Y. Tokubuchi*! 1892); Piratori (*M. Adachi*! 1885); "Utashinai Coal-mine" (*Y. Tokubuchi*! 1892); "Yubari Coal-mine" (*Y. Tokubuchi*! 1893); Kutsukata, ins. Rishiri (*Y. Itô*! 1896); *"falais de Rebunshiri" (*U. Faurie*! 1892). Kurile: *on rocks near Anama, Shakotan (*H. Takeda*! 1909); *on rocks near the mouth of the Poropet, Shikotan (*H. Takeda*! 1909); circa Chikapnai, prope Toputu, ins. Kunnashiri (*C. Yendô*! 1894).

Obs. Certain specimens amongst the above-mentioned, which are marked with an asterisk before the locality, can be distinguished as forma *serrulata* Takeda (*cf.* Tôkyô Bot. Mag. xxiv. p. 64 (1910)), having lower longer petals serrulate. This form is also met with on mountains of Central Japan. Boissieu refers Faurie's specimen, no. 1476, to *S. fusca* Maxim., which is quite a different plant altogether. Also Faurie's specimen, no. 7896, obtained from Tsuruga, in the main island of Japan, is reported by the same authority as *S. cortusifolia.* The specimen I examined at Kew Herbarium is not *S. cortusifolia* at all, but represents *S. nipponica* Makino (*cf.* Tôkyô Bot. Mag. xxiv. p. 1). According to Maximowicz, Siebold and Zuccarini's *S. cortusifolia* includes two plants, one of which is *S. madida* (*S. cortusifolia* var. *madida* Maxim.) Makino; their description "... petalis unguiculatis, duobus quam reliqua tria ovato-spathulata pluries longioribus linearibus acuminatis ..." suggests *S. madida.* I do not venture to divide *S. cortusifolia* Sieb. & Zucc., and employ the name for the plant fairly well characterized and figured by Maximowicz (*l. c.*) and Yatabe (*l. c.*).

3. S. MADIDA Makino in Tôkyô Bot. Mag. xv. p. 11 (1901).

Syn. *S. cortusifolia β madida* Maxim. *l.c.* Yatabe, *l. c.* t. vii.

Nom. Japon. Jinjisô.

Hab. Yezo: "sommet de Rishiri" (*U. Faurie*! 1892, no. 8397 pro parte).

Obs. Faurie's collection no. 8397 is represented by two species of the genus. The one is *S. puntata* L. (cf. infra), the other is the present species, which Boissieu (*l. c.*) took for *S. cortusifolia.* It is difficult to understand the confounding of these well-marked plants. I agree with Makino's separation of this plant from *S. cortusifolia.*

The present species is distributed mainly in Southern and Central Japan, where the northern limit of localities is about 37° N.; it is thus highly interesting to find it in Hokkaidô. The above-mentioned specimens include two forms—one normal, the other with more or less incised lower petals, which I call forma *incisa* (*cf.* Tôkyô Bot. Mag. xxiv. p. 64 (1910)).

4. S. PUNCTATA Linn. Sp. Pl. p. 401. Engl. *l. c.* p. 137. Boiss. *l. c.* p. 686. Yabe et Yendô in Tôkyô Bot. Mag. xviii. p. 184 (1904).

Syn. *S. æstivalis* Fisch. Fr. Schm. Reis. Amurl. Sachal. p. 133.

Nom. Japon. Chishima-iwabuki.

Hab. Yezo: "sommet de Rishiri" (*U. Faurie*! 1892, no. 8397 ex parte; *W. Hirose*! 1896). Kurile: insula Shimushir; in port. Broton (*Kodama*! 1893); ins. Shimushu (*Seki*! 1895; *M. Aizawa*! 1900; *K. Yendô*! 1903).

Obs. The distribution of this plant in Japan is restricted to Hokkaidô and the island of Saghalien.

5. S. FUSCA Maxim. in Mél. Biol. viii. p. 602. Fr. et Sav. *l. c.* p. 146. Miyabe, Fl. Kuril. p. 233. Boiss. *l. c.* p. 686.

Nom. Japon. Kurokumosô.

Hab. Kurile: ins. Eturup: sine loco speciali (*U. Faurie*! 1891, fr.); "vicinity of Tsurubetsu" (*K. Miyabe*! 1884); Porosu (*T. Kawakami*! 1898); Mt. Chirip (*T. Kawakami*! 1898).

β divaricata Fr. et Sav. *l. c.* ii. p. 354.

Nom. Japon. Yezokurokumosô.

Hab. Yezo: sine loco speciali (*Maries*!); Osatsube, prov. Oshima (*K. Miyabe*; 1890); Iwanai (*Takenobu*! 1883); Wakkaoisandô (*K. Miyabe*! 1884); ad fl. Hacham superiorem, prope Satporo (*H. Takeda*! 1908); Yuparo (*Y. Tokubuchi*! 1893);

Shoya, prov. Hidaka (*Y. Tokubuchi*! 1892); Saruru-sandô (*K. Miyabe*! 1884); Saruru (*Y. Tokubuchi*! 1892); Shikaribetsu, prov. Kushiro (*S. Tanouchi*! 1882); Atuyeka, prov. Kushiro (*K. Miyabe*! 1884); Ombetsu, prov. Kushiro (*M. Nakamura*! 1890); Mt. Mashiu, prov. Kushiro (*T. Ishikawa*! 1894). Kurile: ins. Kumashiri: Toputu (*C. Yendô*! 1894).

Obs. Besides these I have seen a good many specimens from various places in Yezo and the islands of Shikotan, Urup, Paramoshiri, which I do not refer to here, as I cannot say with certainty to which variety they belong, owing to absence of inflorescence.

The var. *divaricata* Fr. et Sav. is little known to Japanese botanists; some have suggested the plant may be *S. japonica* Boissieu. The divaricate inflorescence with very slender, more or less intricate branches, and pale darkish flowers are characteristic of this variety. The typical form is not uncommon on high mountains of Central Japan, while the variety has only been collected in Hokkaidô.

6. S. JAPONICA Boissieu, *l. c.* p. 687. Makino in Tôkyô Bot. Mag. xv. p. 32 (1901).

Nom. Japon. Fukiyukinoshita.

Hab. Yezo: loco non indicato (*Maries*!); Shimohurano, prov. Ishikari (*K. Ichikawa*! 1908); "montagne de Shari" (*U. Faurie*! 1890).

Obs. This species is fairly common in shady places along small streams on mountains in northern parts of the main island of Japan. In Yezo it is rather rare, and from the Kurile Islands it is not known.

7. S. BRONCHIALIS Linn. *l. c.* p. 400. Sér. in DC. Prodr. iv. p. 247. Engl. *l. c.* p. 215.

Var. *cherlerioides* Engl. *l. c.* p. 216.

Syn. *S. cherlerioides* Don in Trans. Linn. Soc. xiii. p. 341 (1821).
S. bronchialis Miyabe, *l. c.* p. 233. Boiss. *l. c.* p. 686. Makino, *l. c.* xii. p. 400 (1899) (pars Japon.); xvi. p. 201 (1902).
S. bronchialis β minor Hook. et Arn. in Beechey's Voy. p. 114.
S. bronchialis var. *pseudoburseriana* Fr. Schm. Reis. Amurl. Sachal. p. 133.

Nom. Japon. Shikotansô.

Hab. Yezo: Rebunshiri, on rocks (*U. Faurie*! 1891, 1892; *T. Ishikawa*! 1891); Mt. Rishiri (*U. Faurie*! 1892; *W. Hirose*! 1896). Kurile: ins. Shikotan: Shakotan, on rocks (*K. Miyabe*! 1884; *U. Faurie*! 1891; *T. Kawakami*! 1898; *M. Aizawa*! 1900; *H. Takeda*! 1909); Anama (*H. Takeda*! 1909; *M. Arai*! 1910); Notoro (*H. Takeda*! 1909).

Obs. *S. bronchialis* var. *cherlerioides* Engl. is also found in alpine regions of highest mountains in Central Japan. The typical form of this species grows in Japan only on Mt. Togakushi, province of Shinano, which was reported under the name of *S. bronchialis* var. *cherlerioides* by T. Makino in the Tôkyô Bot. Mag. xii. p. 400 (Japanese). He corrected this view, and stated later, with an error (*ibid.* xv. p. 201), that the plant is *S. bronchialis* var. *pseudoburseriana* Fr. Schm.

8. S. MERKII Fischer in Sternb. Saxifr. Suppl. i. p. 1; ii. p. 19.

Syn. *S. myosotifolia* Don, *l. c.* p. 373. Sér. *l. c.* p. 45.

Var. nov. *robusta* mihi.

Syn. ? *S. Merkii* Maxim. in Miyabe, *l. c.* p. 233.

S. Merkii var. *Idzouræi* Yabe in Tôkyô Bot. Mag. xviii. p. 184 (1904) (pars Japon.), non Engl.

Planta quam typica multo robustior, foliis carnosulis, ciliatis, late obovatis seu late oblanceolatis, basin versus cuneato-attenuatis, apice plerumque trilobatis nec omnibus integris. Scapus 5–13 cm. altus, inflorescentia ad 8-flora.

Nom. Japon. Chishima-kumomagusa.

Hab. Yezo: Mt. Ishikarigoe (*K. Jimbô*! 1891); in monte Nutakkam-ushpe (*A. Andô*! 1907). Kurile: ins. Eturup: Mt. Moyoro (*S. Yokoyama*! 1893; *K. Fukuzawa*! 1894; *T. Kawakami*! 1895; *M. Aizawa*! 1900); ins. Urup: Suribachiyama Volcano (*K. Jimbô*! 1891).

Obs. The present variety resembles var. *Idzouræi*, which comes between the typical form and this new variety; it is, however, smaller in habit, 1–3-florous as in the type. The leaves in the typical form are entire, in var. *Idzouræi* usually trilobate, and often mixing entire ones.

9. S. REFLEXA Hook. Fl. Bor.-Am. i. p. 249, tab. 85. Engl. *l. c.* p. 143. Miyabe, *l. c.* p. 233, excl. syn. *S. Tilingiana* Regel.

Syn. *S. sachalinensis* Fr. Schm. Reis. Amurl. Sachal. p. 133.

S. virginiensis var. *yezœnsis* Franch. in Bull. Soc. Philom. Paris, avril 1888, p. 4. Boiss. *l. c.* p. 686.

Nom. Japon. Iwayukisô; Yamahanasô.

Hab. Yezo: Otaru (*U. Faurie*! 1887, 1888); Satporo, rocky cliffs (*K. Miyabe*! 1878; *Y. Tokubuchi*! 1887); Moiwa, prope Satporo (*H. Takeda*! 1907–1909); Yamahana, prope Satporo (*H. Takeda*! 1908); Piroro, prov. Topachi (*K. Miyabe*! 1884); Uraporo, prov. Tokachi (*Togano*! 1898); Sempoji-sandô, prov. Kushiro (*K. Miyabe*! 1884); Rishiri (*S. Hori*! 1887; *W. Hirose*! 1896). Kurile: ins. Shikotan: Shakotan (*K. Miyabe*! 1884; *T. Kawakami*! 1898; *M. Aizawa*! 1900; *H. Takeda*! 1909); Anama (*H. Takeda*! 1909; *M. Arai*! 1910); ad ostium fl. Poropet (*H. Takeda*! 1909); Notoro (*H. Takeda*! 1909).

Obs. Prof. Miyabe followed A. Gray (*cf.* Proc. Am. Acad. xx. p. 11) in uniting *S. Tilingiana* Regel to the present species. The close resemblance as well as the similar geographical distribution of both the species render the supposition not unreasonable. So far as I can decide from Regel's original specimen collected by Tiling, I agree with Engler in separating *S. Tilingiana* from *S. reflexa*. The two species are very similar in appearance, but *S. Tilingiana* has nearly entire or little repand leaves and capsules not split more than half-way down. Franchet considered our plant to be a variety of *S. virginiensis* Michx., which, though it has a close relation to our plant, is, as A. Gray already pointed out, quite a different species. Boissieu followed Franchet's opinion, and distinguished our plant from *S. reflexa.* I have not succeeded in establishing any specific difference between *S. reflexa* and *S. sachalinensis*, and the latter agrees so perfectly with our plant as to leave no room for doubt.

10. S. RIVULARIS Linn. *l. c.* p. 404. Sér. *l. c.* p. 36, n. 92.

Var. *Laurentiana* Engl. *l. c.* p. 105. Yabe et Yendô, *l. c.* p. 184.

Syn. *S. Laurentiana* Sér. *l. c.* p. 35. Hook. Fl. Bor.-Amer. i. p. 245. Tor. et Gr. Syn. Fl. N. Am. p. 573.

S. exilis Yabe in Tôkyô Bot. Mag. xviii. p. 184, non Steph.

Caulis debilis cæspitosus, circa 4 cm. altus, erectus, superne 1–2 ramosus, pilis longis coloratis intricatis vestitus, paucifoliatus. Folia glabra, subtus ad nervos parce glanduloso-pubescentia, margine sæpe glanduloso-ciliolata, basilaria longe (ca. 2 mm.) petiolata, petiolo pubescenti, basi stipulis ciliatis instructis suffulta, reniformia, palmato 5–7-loba, lobis ovatis acutiusculis, caulina breviter petiolata, 5-loba. Inflorescentia corymbosa, 3-flora; bracteis foliis similibus sed minoribus, basi truncatis subcuneatisve, breviter petiolatis, flores juveniles plus minus involucrantibus 2–3 mm. longis, dense pubescentibus. Calycis laciniæ ovatæ, obtusæ, ciliolatæ, tubo turbinato pubescenti subæquantes, erectæ. Petala oblongo-obovata (rosea ?), basin versus attenuata, breviter unguiculata, trinervia, laciniis calycis duplo, staminibus fere duplo longiora. Capsula matura globosa, calycem subduplo superans, stylis divaricatis brevissimis terminata.

Nom. Japon. Kiyoshisô.

Hab. Kurile: ins. Urup: Perikamai, seven miles westward of Tokotan (*K. Uchida*! 1891); Rakkojima (*T. Kawakami*! 1898); ins. Poromoshiri: Musashiwan (*M. Aizawa*! 1900); ins. Shimushu (*T. Ishikawa*! 1894; *K. Yendô*! 1903).

Obs. The geographical area of this variety is confined to the Kurile Islands and Behring Sea region.

11. S. FAURIEI Boissieu, *l. c.* p. 687.

Hab. Yezo: in promontorio Okchishi (*U. Faurie*! Aug. 30, 1889; Sept. 30, 1889).

Obs. No other localities of this species have been reported from Japan.

EXCLUDED SPECIES.

S. lycoctonifolia Maxim. in Mél. Biol. xii. p. 456. Boiss. *l. c.* p. 686 = *Boykinia lycoctonifolia* Engl. in Engl. u. Pr. Pflanzenfam. iii. 2, A, p. 52.

Nom. Japon. Arashigusa.

Hab. Yezo: "montagnes de Mashike" (*U. Faurie*! 1892, no. 8353); in monte Nutakkam-ushpe (*A. Andô*! 1907).

Obs. As I have stated before, this species may be with reason placed in *Boykinia.* The new combination *Therophon lycoctonifolia*, if necessary, may also be used. I should like to add to Maximowicz's description that the petals are persistent; fruit globose, with styles 2 or 3, exceeding the erect calyx-lobes, divergent, seed minute, nearly half a millimetre long, narrowly ovate, testa very densely and minutely muricate. The persistent petals, which are shorter than calyx-lobes, are quite peculiar to this species, and are not to be met with in other species of *Boykinia*.

Appendix.

From all other parts of Japan, excepting Korea, the following species have been recorded:—

S. sendaica Maxim. in Bull. Acad. St. Petersb. xviii. p. 38.
Hab. Central Japan.
S. nipponica Makino, *l. c.* xv. p. 10.
Hab. Central Japan.
S. tellimoides Maxim. in Bull. Acad. St. Petersb. xvi. p. 216.
Hab. Central Japan.
Var. *Watanabei* (Yatabe), Makino, *l. c.* xv. p. 12.
Hab. Southern Japan.
S. cernua Linn. Sp. Pl. p. 403.
Hab. Alpine region of mountains, Central Japan.

On varieties and forms of *S. cortusifolia* and *S. madida* cf. Tôkyô Bot. Mag. xv. p. 12; xvi. p. 202; xxiii. p. 72; xxiv. pp. 30, 64.

LITHOPHYLLUM IN THE BRITISH ISLES.

By A. D. Cotton, F.L.S.

In the Catalogue of British Marine Algæ by the late E. A. L. Batters, it will be noted that no mention is made of *Lithophyllum fasciculatum* Fosl., the plant figured by Harvey as *Melobesia fasciculata* in Phycologia Britannica (Plate lxxiv.). A careful perusal of the species enumerated in the Catalogue, and especially of their distribution, shows that *L. fasciculatum* is united with *L. Racemus* Fosl. As interpreted by Foslie, and as generally understood at the present time, these two species, though occasionally resembling each other in form, are perfectly distinct, and there can be little doubt that the manner in which they are presented by Batters is due to an oversight, although positive proof of the fact is not forthcoming. Considering the important place the Catalogue holds amongst algologists, and the entirely different distribution of the two species, a note of explanation and correction has been thought advisable.

It is well known that *Lithothamnia* are exceedingly difficult to examine, and that for microscopic investigation they require special methods of manipulation. The late M. Foslie of Trondhjem devoted many years to their study, and was the recognised authority on the group, and although it is now impossible to refer the matter to him, his views on the species in question are clearly expressed in several of his published papers. The specimens in the Batters collection at the British Museum throw no light on the subject, and there is no direct evidence as to his views; but it is well known that Batters consulted Foslie as to British *Litho-*

thamnia, and that with regard to this group of algæ he accepted Foslie's naming practically without question.

Foslie's opinions may be summarised as follows:—In the first place, it should be noted that he does not attempt to interpret Lamarck's *Millepora fasciculata*, which was probably composed of several species, but that he regards Harvey's account and illustration as the first satisfactory description of the plant.

In his "List of Species of Lithothamnion" published in 1898, he keeps *Lithophyllum fasciculatum* and *L. Racemus* distinct. But with a view to a clearer understanding of Harvey's species he visited Roundstone in April, 1899, whence the specimens of *L. fasciculatum* figured by Harvey were obtained. An account of his visit to this well-known collecting-ground in Co. Galway is given in the *Irish Naturalist* (vol. viii. 1899, p. 175). Amongst the calcareous algæ obtained was a plant which he says "fully agreed with the typical *L. fasciculatum* Harv.," and also a number of other specimens which he considers forms or varieties of the same species. The latter are dealt with in detail in his paper "New or Critical Calcareous Algæ" (1899), in which the affinities of the plant are discussed and five distinct forms described, including f. *eunana* and f. *compressa*.

Although from these papers it is evident that Foslie somewhat modified his views as to *L. fasciculatum* after his Roundstone visit, he says nothing whatever about uniting it with *L. Racemus*. With regard to the latter plant he states that it is a Mediterranean species, and that the only British specimens he had seen were dead examples from Falmouth (*Flora of Koh Chang*, Algæ, 1901), whilst his concluding statement as to *L. fasciculatum* is: "I have hitherto but seen certain specimens of this species from the west coast of Ireland" ("New or Critical Calcareous Algæ," p. 31).*

In 1902 Batters published his Catalogue; he entirely omits the name *L. fasciculatum*, but includes the varieties *eunana* and *compressa* under *L. Racemus*, and gives their distribution as the West of Ireland. If Batters were following any change of opinion by Foslie, the latter must have taken place during the years 1901 or 1902. There is no evidence that Foslie changed his mind, nor that Batters for reasons of priority employed a different nomenclature. With regard to the latter there is direct evidence to the contrary, as in the list of changes of nomenclature given by Batters at the end of the Catalogue neither species is referred to. There would appear, therefore, to be no doubt that the two species were unintentionally united.

The distribution of the species according to Foslie is as under:—

L. Racemus Fosl. North Atlantic: Mediterranean, Adriatic, English Channel (Falmouth, only dead specimens known), Bahamas, Red Sea. Indian Ocean: Mauritius, Rodriguez.

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* At the same time Foslie records *L. fasciculatum* var. *eunana* from Larne Lough, on the east of Ireland. The writer has seen the Larne Lough specimens, and they are sterile, and he cannot help thinking that Foslie's earlier determination of the material is the more correct, namely that it is a form of *Lithothamnion calcareum* and not a form of *L. fasciculatum*.

L. FASCICULATUM Fosl. Co. Galway: Roundstone Bay (McCalla, Hanna, Foslie), Fahy Bay (Hanna in Herb. Batters). Co. Cork: Schull (ex Johnson, in list of Irish Corallinaceæ). Co. Waterford: Ballynacourty (ex Johnson *l.c.*).

Exsicc.—Holmes, *Algæ Britannicæ Rariores* no. 262.

CHÆROPHYLLUM AUREUM L. IN BRITAIN.

By G. Claridge Druce, M.A., F.L.S.

In *English Botany*, under t. 2103, published in January, 1810, there is a description of the above-named Umbellifer, which Smith says was found by G. Don "in the borders of fields, between Arbraath [Arbroath] and Montrose, and at Corstorphine, near Edinburgh." Subsequently Don (Herb. Brit. fasc. ix. ? 1812, No. 207) repeated the above record, adding, "I observed what I believed to be an intermediate plant between this and the *C. sylvestre*, near the village of Kirkliston, about ten miles west from Edinburgh." The specimen in his *Fasciculus* is correctly named, but no one seems to have found the plant again in either of the above localities, and Hooker (*Student's Flora*, p. 531) says, "Scotland, G. Don, not confirmed." It was therefore a great pleasure to hear from Mr. James Fraser, of Leith, in 1909, that he had found it at Callander.

Last year I had perforce to break my journey at this popular centre, and after dinner strolled out; to my surprise, within five minutes' walk of the 'Dreadnought' Hotel, I met with *C. aureum*, growing in great quantities by the Teith, up the banks of which I traced it north-westwards for more than a mile, growing in immense quantities to the exclusion of *C. temulum*. It was not only on the banks of the river, but also in some meadows and fields and under walls in the vicinity; doubtless its very abundance having led the numerous botanists who must have visited this place to think it was a form of *Anthriscus sylvestris* Hoffm., which it somewhat suggests. A closer examination, however, shows that this plant is a perennial, and it has not the furrowed stem of *A. sylvestris*. From *C. temulum*, which its somewhat spotted stems with swollen nodes might suggest, its perennial growth, its leaves of a brighter green and firmer texture and with *acute* segments, and its umbels with denser and more showy flowers, clearly distinguish it. It was pleasant to see, so firmly established, another of Don's reputed discoveries.

A word or two may be said as to the status of the plant. Its Continental distribution is rather against its being Scottish, and Nyman says it occurs in South Germany, Switzerland, Italy, &c., but not in France (except the Pyrenees), Holland, Belgium, or Northern Germany, while it is adventitious only in South Norway. It is a plant which would scarcely tempt the horticulturist to introduce it to his garden but, like the Chervil, it has aromatic properties, and it may have been at one time used as a condiment, since Mr. Clement Reid informs me he has found a single fruit in Roman Silchester. At present we can only regard it as a well-established alien. Now that attention has been called to it, the plant may be found elsewhere in Scotland. The specific name is somewhat misleading, referring, as it does, not to the flower, which is of a purer white, I think, than either *temulum* or *sylvestris*, but to the fruits, which as they ripen have a greenish golden hue.

DOUBLE FLOWERS.

By A. R. Horwood.

In an interesting communication Miss Helen Saunders (p. 62) describes her recent discovery of wild double daffodils, and she would explain them as due to overcrossing, or excessive interbreeding as we may call it; but she states that gardeners do not procure them by any uniform plan, nor universally by crossing. It is certainly the case that they are commonest under cultivation. And yet in spite of this and the known neglect by horticulturists of artificial crossing to account for them, she proposes this method as responsible for those found double in a wild state, when a reason lies to hand which is constant under all conditions, *viz.*, the irritation caused by insects, which is common also to many other types of monstrosities or malformations. This agency Miss Saunders dismisses as not reasonable; but surely a fact may be known without a reason for it? And so it is that the double flower has been found by reputable botanists such as Molliard ("Cécidies Florales," Ann. des Sci. Nat. sér. viii. 1895, p. 67) to be due to mites which set up an irritation, and cause thereby teratological structures. The work of Masters amply illustrates the variety of these monstrosities.

Peyritsch has shown also that by their means petals become sepals and stamens petals. Is it then unreasonable to say that a double flower with additional petals is due to insect irritation? If so, we should have to dismiss then as unlikely the supposition that the fastigiate galls upon trees—with which double flowers are strictly comparable—are due to insects as equally unreasonable. But it is almost a truism to remind anyone that galls are actually produced by certain *Cecidomyidæ*, allied to those that cause double flowers. And just as these galls, as Darwin has remarked (*Animals and Plants under Domestication*, 1868, p. 283), come remarkably true to character each time, though so different amongst themselves and produced, moreover, by different insects so closely allied, so double flowers initially produced by gall-insects, once brought into existence, come true generation after generation. If one compares a double daffodil with the fastigiate flower-like gall or "helix" of the "rose" willow, where is the difference in the nature of the work done? True, there is a difference in the organs or parts—in the one case, petals, in the other, foliar appendages—but every botanist knows in his own experience many cases of such phenomena—that the budding of one organ out of another proliferation (as this is called) is due also to insect agency or soil conditions, and what is possible in the one case may assuredly be held to be so in another. Vivipary and prolepsis are equally intelligible by appealing to soil conditions in the one case, insect agency in the other.

Moreover, the existence of imperfect stamens in these plants, although the flowers are said to differ from the common double daffodil, indicates not so much a case of crossing, but one in which the production of seed has been prevented by some abnormal cause.

This non-production of seed is well known in the violet, which lacks petals in the seed-producing state, but is here due to another reason, doubtless the early season of flowering and want of cover for the seeds or means of burying them or ripening them. In the case of the double narcissus, insects disturb the regular working of the floral structure, and activity is centred in petal-formation instead of seed-formation, just as petals in the violet are dispensed with when the embryo is destined to mature in the ovary.

If further suggestion were needed as to the probable cause of the production of double daffodils at Chittlehampton, it is to be sought in the well-established fact that similar teratological abnormalities can be induced by a mere pin-prick, so that *mechanical* stimulus may also be the inducing agent, as well as insect intrusion.

Turning, lastly, to analogy in the animal kingdom, would it be more unreasonable to make the suggestion we have made, or to draw attention to ascertained facts as to the origin of double flowers, than to suggest to a Cingalese that pearls were due to the irritant action of sand upon the shell-wall of an oyster? With this case for reflection and comparison, I would venture to suggest that Miss Saunders may have rather too readily thrown aside the knowledge of experienced botanists and horticulturists.

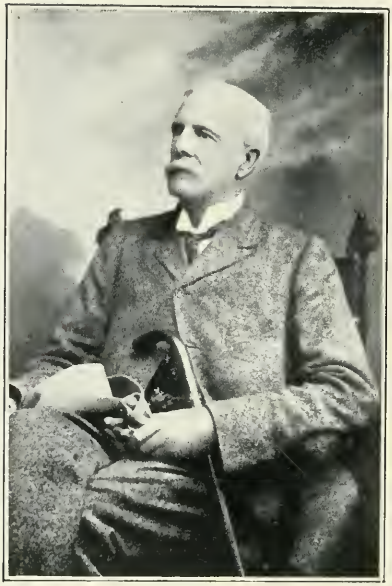
A NEW BRITISH FLORA.

From time to time notices have appeared in this Journal announcing the preparation of a new British Flora. The necessity for such a work on modern lines has during the last few years become increasingly obvious, and Prof. Trail in his presidential address at the British Association last year (reprinted in this Journal, 1910, pp. 241–250) emphasized this necessity and suggested preliminary steps towards carrying out an adequate scheme. There is of course ample provision for the field botanist in the way of handbooks which enable him to determine the various forms he may meet with, and through the medium of this Journal and the Exchange Clubs he is kept fairly *au courant* with critical investigation; but something more than this is required, notably in the direction of illustration. It is therefore with much satisfaction that we learn that the Cambridge University Press have made arrangements for the issue of such a Flora, under the capable editorship of Dr. C. E. Moss, the Curator of the University Herbarium. Dr. Moss, although a comparatively recent addition to the students of the British Flora, has already, as our pages have shown, established his reputation as a careful investigator of the life-history of plants and of the works of the earlier writers and observers; he is, moreover, young, and will thus, in the natural course of events, be able to carry out a scheme which will require time to bring to completion: no better choice could, therefore, have been made.

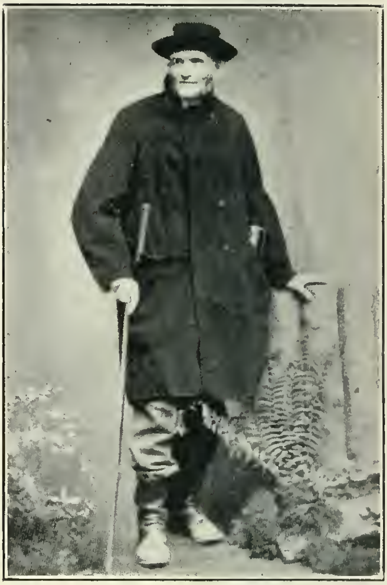
It is expected that the *Flora* will be completed in ten volumes, which will be issued annually. The cost will be about two guineas a volume. The high price is necessitated by the illustrations. Each species, in addition to many varieties, will be illustrated by Mr. E. W. Hunnybun's beautiful pen-and-ink drawings, about 1750 of which have already been completed. Each of Mr. Hunnybun's drawings has been made from living specimens; each plant has been drawn natural size, and, in addition to a general drawing of each plant, there will be enlargements of critical organs; and, in the case of critical species and varieties, the name of each specimen drawn from has been vouched for by some competent authority, whose letter of identification has been preserved. In addition to these drawings, there will be numerous photographs of plants in their natural habitats, and maps indicating the distribution of certain genera and species will be freely supplied.

Engler's system of classification will, generally speaking, be followed. This system is becoming very generally adopted, and already there are German, Swiss, and American floras based on this system, which without doubt represents a great advance in several respects on that of Bentham and Hooker. The first volume to appear (which will be vol. ii. of the *Flora*) will deal with the earlier Dicotyledonous families, from the *Salicaceæ* to the *Chenopodiaceæ*. The Monocotyledonous families will appear last. Gymnosperms and Pteridophytes will also be included, and perhaps the Charophytes. In addition to the systematic descriptions—which will be in English and not in Latin—of the various groups, there will be short statements of the affinities of the various orders and families, and the geographical distribution of the various groups will be given. So far as is possible, recent accepted work on morphology and ecology will be incorporated in the descriptions.

Dr. Moss will utilize the services of specialists in several of the more critical genera. Already many well-known botanists have promised their aid, *e.g.* Mr. G. C. Druce (*Cerastium*, &c.), Mr. A. B. Jackson (*Thymus*), Rev. E. F. Linton (*Salix*), Rev. E. S. Marshall (*Cochlearia*, *Epilobium*), Mr. Bennett (*Potamogeton*), and Mr. H. W. Pugsley (*Fumaria*). The first volume will deal with such difficult genera as *Populus*, *Quercus*, *Ulmus*, and *Salicornia*, on all of which the author has been engaged for some years.



HENRY CHICHESTER HART



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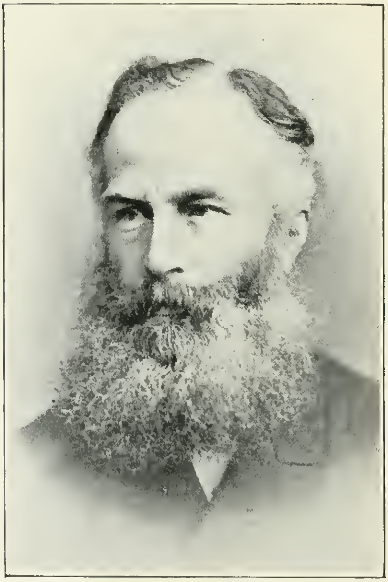
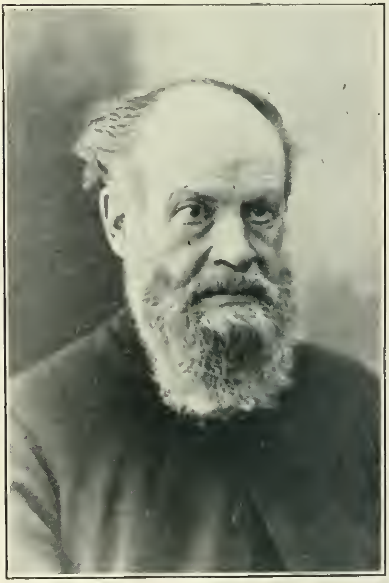


EDWARD PERCEVAL WRIGHT



WILLIAM HUNT PAINTER

It will be necessary to keep a uniform standard of the extent and limits of the species, and with this end in view it may be desirable for the author to act in an editorial capacity when dealing with the genera written by specialists; but, so far as is possible, each specialist will be given a free hand in the treatment of his particular genus.

Special attention will be paid to nomenclatorial matters, and the International Rules will, in general, be followed.

Vol. i., which will be about the fourth or fifth volume to appear, will contain the Gymnosperms and Pteridophytes, and the introductory chapters. The latter will deal with topographical distribution, and with such questions as the origin of the British Flora.

SOME IRISH BOTANISTS.

By the Editor.

(with portraits.)

For many years this Journal has given prominence to biological notices of botanists of these kingdoms who have been removed by death from the fields in which they have won more or less distinction, or have at least put on record in these pages some evidence of their attachment to botanical investigation, representing different grades of society but one in their common interest in botany. In the case of the three Irishmen of whom I now propose to give a somewhat belated notice, ample accounts have appeared in the pages of the *Irish Naturalist*, to whom I am indebted for many of the following facts, and also for permission to reproduce the excellent portraits which accompany the memoirs. Although late, it seems right that some notice of them should appear in these pages, to which two at least were frequent contributors.

Henry Chichester Hart
(1847–1908)

was born at Raheny, Co. Dublin, on July 29, 1847, at which time his father, Sir Andrew S. Hart, was Vice-Provost of Trinity College, Dublin, where he graduated B.A. in 1869. He came of a Donegal family, and in his early youth began the investigation of the county which, after several papers in this Journal from 1879 to 1896 and reports in the Proceedings of the Royal Irish Academy, culminated in his *Flora of Donegal*, published in 1898. Numerous other papers dealing with the botany of various parts of Ireland will be found in the two publications named, in which his name appears as early as 1873, in connection with the discovery of *Alchemilla alpina* in Wicklow; those in this Journal were often written in narrative form and, though thus less convenient for comparison than a mere list, make far more interesting reading, containing as they do many observations on the people and customs of the different districts, and on other points connected with his excursions. His papers related mostly to phanerogams, but in 1886 he published a list of localities for the hepatics and mosses which he had collected at various times in Ireland. Some of his later notes on Irish plants were printed in the *Irish Naturalist.* His many observations on the plants of the Irish mountain ranges are summed up in a paper contributed to the Proceedings of the Royal Irish Academy in 1891. The tribute paid to Hart's work in the second edition, founded on the papers of his life-long friend A. G. More, of the *Cybele Hibernica*, by its editors, Messrs. Colgan and Scully, is evidently well deserved: he "has done more," they say, "to further our knowledge of Irish plant distribution than any other explorer of recent times." His last note in this Journal records his discovery in Skye of *Arabis alpina*, of which Mr. Druce recently exhibited Skye specimens at the Linnean Society. He died at his residence, Carrablagh, on Lough Swilly, Donegal, on Aug. 7, 1908.

But Hart's botanical work was by no means limited to these islands. In 1876 he was appointed naturalist to the British Polar Expedition, and his exceedingly interesting account of the localities visited and of the plants collected by himself and his colleagues extends throughout this Journal for 1880, its earlier production having been deferred through ill-health. In 1883 he took part in an expedition organized by the Palestine Exploration Fund; his report on the botany of Sinai and South Palestine is published in the Transactions of the Royal Irish Academy, xxviii. (1885), and that on the botany of the Jordan Valley and Western Palestine in the Journal of the Exploration Committee for 1885: the former contained descriptions and figures of three new species, and added about seventy plants to the Palestine flora. The observations detailed in these two papers, with the zoological results of the expedition—for Hart was also an accomplished zoologist, although his work in that direction does not come within the scope of this notice—are brought together in his volume entitled *Some Account of the Fauna and Flora of Sinai, Petra, and Wâdy 'Arabah*, published by the Exploration Committee in 1891. The specimens collected both on the Polar and Palestine expeditions are in the National Herbarium and at Kew. Hart became a Fellow of the Linnean Society in 1887, but his name does not appear in recent lists.

For an account of Hart's striking personality and various interests, and a general estimate of his work, reference must be made to the biography by his intimate friend and companion on many expeditions at home and abroad, Mr. R. M. Barrington, published, with an excellent portrait, in the *Irish Naturalist* for December, 1908. This contains a bibliography completing that published in *Irish Topographical Botany*, p. cxxii.

SAMUEL ALEXANDER STEWART
(1826–1910)

As is pointed out by the Rev. C. H. Waddell in his interesting sketch in the *Irish Naturalist*, Stewart stands alone among Irishmen as an example of the "working-man naturalist" of whom England and Scotland have furnished numerous instances. His grandfather went to America about 1798 and settled in Philadelphia; here Samuel was born on Feb. 5, 1826. At the age of twelve he returned with his family to Belfast, where in spite of many difficulties he succeeded, at a time when facilities for the purpose were few, in obtaining a good general education. The classes conducted in natural history by Ralph Tate in 1861–64 under the Science and Art Department enabled Samuel to develop his bent in that direction; he distinguished himself in every class, obtaining first class certificates and often silver or bronze medals in geology, mineralogy, and in systematic and physiological botany and zoology. To these classes may be traced the establishment in Belfast of a taste for natural history; Tate early established field excursions for his more promising pupils, of whom Stewart was one, and in 1863 founded the Belfast Field Club, of which Stewart was always an enthusiastic supporter, and to whose Proceedings he contributed numerous papers on botany and geology. In 1871 Stewart became a Fellow of the Botanical Society of Edinburgh; in 1890 he was appointed assistant curator of the Belfast Museum, succeeding to the curatorship in 1891. In 1904 he was elected an Associate of the Linnean Society—an honour which was celebrated by his friends at a public meeting in the Museum, when he was presented with an address and a purse of £120. In 1907 he retired from the Museum, but still continued to take an interest in his favourite studies; his death on June 15 last year was the result of a street accident. He was buried in the City Cemetery, where a suitable monument will be erected to his memory by the members of the Field Club.

Mr. Praeger, who adds to Mr. Waddell's account of Stewart's life an appreciation of his work, appends to it a very full bibliography. His contributions to this Journal range from 1884 to 1899, in which latter year (p. 396) he defended the *Cybele Hibernica* from certain criticisms it had received. Most of his papers naturally appeared in the *Irish Naturalist* and in other Irish publications. Stewart was generous in the distribution of specimens and was a corresponding member of the Botanical Exchange Club. Both his biographers bear witness to his modesty, energy, and accuracy, as well as to his willingness to help all who asked his assistance.

EDWARD PERCEVAL WRIGHT
(1834–1910)

He was born in Dublin on Dec. 27, 1834, and began life as a clerk in a commercial company. In 1853 he entered Trinity College, where he graduated in 1857 and was in the same year appointed director of the College Museum. He studied natural science under G. J. Allman, then the University Professor of Botany, and in 1854 began to publish the *Natural History Review*. In 1857 Wright was appointed Director of the Dublin Natural History Museum; in 1862 he took the degree of M.D. and practised in Dublin as an oculist. His appointment as *locum tenens* for Harvey, then Professor of Botany, in 1865–66 turned his thoughts again in the direction of natural science; and in 1869 he became Professor of Botany, in succession to Alexander Dickson who had been appointed to Glasgow, and Keeper of the Herbarium in Trinity College in 1870—the former post he resigned in 1904, owing to failing health, retaining the latter for some time longer.

Before his definite appointment, Wright occupied himself with botanical travel in various directions. His expedition to the Aran Islands in 1865 resulted in a paper published in the Proceedings of the Dublin Natural History Society for 1866–7, which was his principal contribution to Irish botany; his last published note, however (Notes from Bot. School 237 (1904)), relates to the occurrence of *Euphrasia occidentalis* in Ireland. In 1867 he visited the Seychelles, where he stayed six months; of his visit he gives an account in a privately printed letter addressed to the President of the University Board, who had obtained for him an extended leave of absence: the botanical results of the visit are published in the Transactions of the Royal Irish Academy xxiv. (1871). Wright spent the spring of 1868 in Sicily, and published the zoological results. He was at least as competent a zoologist as a botanist: the list of his papers in the Royal Society's Catalogue shows that his scientific interests extended over a very wide field. Perhaps his most important botanical work was connected with Algæ, on whose structure and development he published a series of memoirs.

Wright took great interest in the Herbarium of which he was Keeper, and in the first number of the *Notes from the Botanical School* of the College—a journal published under his control and at his expense from 1896 to 1905—he gives a useful account of its history and contents, in the course of which it becomes apparent that, but for his activity, there would have been no herbarium to keep, as it had been untouched from 1866 to 1869. He was extremely generous in lending the important South African collections made by Harvey in connection with the *Flora Capensis*, and apparently not always quite careful in noting to whom they were sent; I remember being fortunate enough to put him on the track of the *Asclepiadaceæ* which had been lent to a botanist who at one time proposed to work at the order, and had for a long period been lost sight of.

Dr. H. H. Dixon's account in the *Irish Naturalist*, to which I am indebted, makes no reference to Wright's genial personality. He was a thorough Irishman—it is understood that his Home Rule proclivities diminished his popularity among his colleagues; and on his rare visits to the National Herbarium he brought into it a breeziness characteristic of his race. After his retirement he spent much of the winters at Poggio Gherardo, the classical villa near Florence where Mrs. Janet Ross has for many years extended charming hospitality to literary men. Here I last met him in 1908; he was as genial and amusing as ever, but there was a feeling that the visit would be his last, as indeed it proved to be.

Three Seventeenth Century Botanists.

The following, which I had intended to print as a separate note, may fitly appear as an appendix to the foregoing.

In the *Correspondence of John Ray*, printed for the Ray Society in 1848, occur the names of three Irish botanists of whom nothing further appears to be known. Their names occur in a letter written to Ray on Aug. 26, 1696, by Dr. Francis Vaughan, "a learned physician of Ireland, living at Clonmel, in the county of Tipperary"—so Ray describes him in a letter to Sloane (p. 313)—in which Vaughan says: "Dr. Wood, Dr. Mitchell, and I have resolved to be as curious as our leisures will permit in making a collection of what plants this kingdom affords. We have begun this summer at Wexford, where we casually meet to drink the medicinal waters, and in the month we stayed there we made up a catalogue of about 280 plants, to which we have and design to augment as opportunity offers to any of us" (p. 304). Vaughan sent Ray an account of the poisoning of "eight young lads" in Co. Tipperary by eating the roots of *Œnanthe crocata* (p. 314), which was sent by Ray to Sloane on March 16, 1697, and is printed also in Phil. Trans. xx. 84 (1698). Later (April 24, 1697) Vaughan sent Ray an account of a case of poisoning by *Euphorbia hyberna* which occurred eight miles from Clonmel—"some of the Irish use this root boiled in milk as a cathartic"; and speaks of the local employment of *Hypericum elodes*—"the native Irish call it Birin Yarragh, which signifies *Herba dysenterica*, and use it in that distemper with good success," as Vaughan himself did (pp. 319, 320). Vaughan's account of *Œnanthe* is referred to by Threlkeld (Syn. Stirp. Hibern. (not paged) 1727) and that of the *Euphorbia* in Molyneux's appendix to that work (p. 22), but neither Threlkeld nor K'Eogh (Botan. Hibern., 1735) mention him or the others among their authorities or subscribers. Wood, who signs himself N. W., writes to Ray on Aug. 31, 1696, from Kilkenny as to the use of "dullysk" in Kerry (p. 305), and from the same place (where he doubtless resided) on April 28, 1697, about the depositing of eggs in rushes by insects (p. 320). There is a letter from Mitchell written from Dublin to Sloane (Sloane MS. 4075 f. 203), dated 6th Oct. 1724, of purely medical interest. Mr. Praeger can tell me nothing of Vaughan, Wood, or Mitchell, but suggests that some reader of the Journal may throw light upon them.

WILLIAM HUNT PAINTER.

(1835–1910.)

William Hunt Painter was born in Birmingham on July 16, 1835. Of his earlier days I know nothing, but in 1861 he entered the ministry of the Church of England. He had intended to engage in missionary work in connection with the C.M.S. and for this purpose was trained at the Islington Missionary College, but owing to obstacles he took up home work, his first curacy being at Barbon, Westmoreland. Here he made the acquaintance of the Rev. Robert Wood, by whose advice he began the study of botany. In 1865 he came as curate to High Wycombe, where I made his acquaintance, and had his company on many botanical rambles. After occupying a similar position at Edgbaston, Derby, and Bristol, he was appointed rector of Stirchley, Shropshire, in 1894, remaining there until 1909, when, in consequence of failing health, he went to live in Shrewsbury, where he died on Oct. 12 of last year: he was buried at Stirchley.

Although it cannot be said that Painter occupied a leading position among British botanists, he did a good deal of useful work, most of which has appeared in the pages of this Journal. Among phanerogams his principal work was connected with the flora of Derbyshire, on which he published a long paper in 1881 and supplementary notes in 1889; these formed the basis of his volume *Contributions to the Flora of Derbyshire*, published in the latter year, reviewed somewhat critically by Mr. Bagnall (Journ. Bot. 1899, 318); a supplement, which appeared first in the *Naturalist* for 1899–1902, and was subsequently issued as a small volume, showed that the author himself was fully conscious of the imperfections of his book. During his stay at Falmouth in the spring of 1898, Painter took up the study of mosses, which from that time forward formed his chief botanical interest, and occupied his attention during his holidays; papers on the mosses of Falmouth, Derbyshire, Brecon, and Cardiganshire, will be found in this Journal for 1900, 1902, 1904, and 1906 respectively.

Painter was for many years a member of the Botanical Exchange Club, and was a considerable collector, although his specimens were not of the first order. Many of them are in the British collection of the National Herbarium; but his own herbarium with his geological and other collections was presented to University College, Aberystwyth, before he left Stirchley.

The *English Churchman* of Oct. 20, which gives some account of Painter's not remarkable ecclesiastical career, says that "in his death the Church of England has lost a faithful and devoted minister who was ever jealous for the maintenance of its Protestant principles"; he belonged, indeed, to the straitest sect of Evangelicalism, a school which has been steadily declining in influence since the days of the Oxford Movement.

The portrait is from a photograph lent by his widow.

James Britten.

SHORT NOTES.

Introductions at Paisley.—The following is a portion of a paper published in the *Selborne Magazine* for March:—"During the summer now ended the strange flora of a waste piece of land in the south of Paisley, Renfrewshire, N.B., excited much interest and discussion among the members of the local Naturalists' Society. In addition to a large number of the commoner wild flowers of the district, forty plants, either casuals for the district, or, if indigenous, of very rare occurrence in the shire, were observed. This waste land, which is about one-eighth of an acre in area, occupies part of the site of an old sandstone quarry, and has been slowly formed by the dumping of much heterogeneous material into the excavation caused by former quarrying. Road-scrapings, sand, soot, lime, broken bricks, dung, garden refuse, and the sweepings of the kilns of a local brewery have all contributed their quota to the levelling up of the ground. The resultant soil, as may be imagined, is of a very varied nature. The only reasonable explanation that can be offered of the appearance of many of the plants in this part of the kingdom is that they have been introduced to this particular waste land as seeds, through the medium of the contributions from the brewery. A collection of the forty plants was made, and after their identification had been verified by P. Ewing, Esq., F.L.S., of Uddingston, they were exhibited at a meeting of the Natural History Society of Glasgow on Oct. 25th, and subsequently at a meeting of the Paisley Naturalists' Society on Nov. 4th. The following plants were included in the collection:—†*Ranunculus arvensis* L., †*Delphinium Ajacis* L., †*Glaucium corniculatum* Curt., *Sisymbrium Sophia* L., †*Erysimum repandum* L., *E. cheiranthoides* L., *Conringia orientalis* Dum., *Camelina sativa* Crantz., †*C. sativa* Crantz var. *fœtida* (Fr.), †*Lepidium ruderale* L., *Thlaspi arvense* L., *Reseda lutea* L., *Saponaria Vaccaria* L., †*Silene noctiflora* L., *Malva rotundifolia* L., †*M. parviflora* L., †*Linum angustifolium* Huds., *Medicago hispida* Gaertn. var. *denticulata* Willd., *Melilotus officinalis* Lam., *M. alba* Desr., *Trifolium arvense* L., †*Vicia lutea* L., *V. bithynica* L., *Lathyrus Aphaca* L., †*Caucalis daucoides* L., †*C. latifolia* L., †*Bupleurum rotundifolium* L., *Anthemis Cotula* L., †*Cirsium arvense* Scop. var. *setosum* C. A. Mey. f. *argenteum* (Buch.-White), *Cichorium Intybus* L., †*Ambrosia trifida* L., *Lysimachia vulgaris* L., †*Lappula echinata* Gilib., *Convolvulus arvensis* L., †*Datura Stramonium* L., †*Calamintha Acinos* Clairv., †*Amaranthus retroflexus* L., †*Setaria viridis* Beauv., *Phalaris canariensis* L., †*Avena fatua* L."

Tortula canescens Mont.—Miss C. E. Larter in her paper on Devon Mosses and Hepatics (*Trans. Devonshire Assoc. for the Advancement of Science, &c.* xl. 1908) records this rare species from Devonshire, specimens in the Torquay Nat. Hist. Museum, collected in 1869 by Mrs. Griffiths, having been identified by Mr. E. M. Holmes. Last year Miss Larter had the pleasure of refinding it in its original locality, Meadfoot Cliffs, where it was also gathered, under her direction, by Mr. G. Wrey. In February of this year among some mosses sent to me by Miss Larter for determination I detected this interesting species in young condition, sent as a species of *Pottia*. It was with some difficulty that I was able to convince myself that my determination was correct, for the hair-points were, comparatively speaking, short, and the

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Plants marked (†) have not been previously recorded for Renfrewshire.

calyptra was quite distinctly *papillose!* However, specimens sent a few weeks later with normally developed hair-points and good mature capsules set any doubts at rest; and I think it is worth while putting on record this strange form. The calyptra varied considerably, but was, I believe, fairly constant within each tuft; in some quite smooth, in others slightly scaberulous, while in a few tufts it was quite as rough as in, e.g., *Pottia Wilsoni.* I find the calyptra markedly scabrous also in specimens gathered at Stanner Rock, Radnor, by Rev. C. H. Binstead. The fact is the more interesting because a *smooth* calyptra is usually given as a generic character of *Tortula*, as contrasted with *Pottia*, in which it is not unfrequently rough. The rather peculiar structure of the nerve in this species may be here referred to, as I have not seen it noticed elsewhere. Viewed from in front the nerve appears slightly thickened and spongy in the upper half of the leaf; and not unfrequently richly chlorophyllose cells in two or three rows give it a dotted appearance somewhat as in certain exotic species of *Catharinea.* The explanation is seen on cutting a section. The ventral cells of the surface of the nerve are large, elongate (two or three times as high as wide), frequently appearing (in section) subcylindric and often detached from one another except at the base, and crowned with a beautiful fringe or crest of papillæ. It thus shows a distinct approach to the structure of the nerve in *T. atrovirens* (Sm.) Lindb. (*cf.* Limpricht, Laubm. I. fig. 183), but the ventral cells are less numerous (in 3–4 rows), and less elongate in section; while, on the other hand, when almost free from one another they are even more striking, and give an almost lamelliferous appearance, as noted above, to the nerve.—H. N. DIXON.

JUNCUS LEERSII Mars. IN BERKS.—Recently a herbarium which was made by Mr. W. H. Holliday, a friend of Henry Boswell, of Oxford, came into my possession. Holliday was in the fifties a very enthusiastic bryologist, as his herbarium testifies, while his collection of local plants consisted of most carefully selected, well dried, and accurately named specimens. These were chiefly obtained from the neighbourhood of Oxford and of Great Marlow in Bucks, many of his specimens being the earliest evidence of their occurrence in the latter county. These include *Lythrum Hyssopifolia* L., which Gotobed recorded from near Windsor—a locality which may be in Berkshire. The Oxford plants include the earliest voucher for *Agrimonia odorata*, and, from Berkshire, the Rush named above, which is a hybrid of *J. conglomeratus* with *J. inflexus.* This he gathered near South Hinksey, in 1860, in the vicinity of *J. diffusus*, itself a hybrid (*J. effusus* × *inflexus*). —G. CLARIDGE DRUCE.

DRABA MURALIS L. IN BERKS.—Last September, Mr. Herbert Napier, who has been diligently studying the mosses near Oxford, brought me a specimen of the above plant which he had found in Wytham Woods, in Berkshire. I visited the spot and found that it was plentifully scattered over a small planting of young ash trees which had been recently cut, but with the exception of

Solanum nigrum there was no other alien present. But as the plant was quite restricted to this area, which is a nursery for young trees, we can scarcely claim the plant as a native of the county. My own belief is that the *Draba* was brought with ash saplings (probably from Derbyshire) to the nursery near the Abbey; that place being found unsuitable, they were transferred to this hilly woodland (on coralline oolite) and that the plant was thus introduced.—G. CLARIDGE DRUCE.

MALAXIS PALUDOSA Sw.—This was discovered in 1908 or 1909 in a small mountain bog near Brecon by Miss de Winton. She could only find it in one of many bogs of the kind in the neighbourhood, and there was very little of it. I have a specimen. The plant is given in Top. Bot. for no other Welsh county than Carnarvon.—H. J. RIDDELSDELL.

REVIEWS.

Fossil Plants. A Text-Book for Students of Botany and Geology. By Prof. A. C. SEWARD, F.R.S. Vol. ii. 8vo, pp. 624, with 265 illustrations. Cambridge University Press. Price 15*s.* net.

ONE of the most important contributions to botanical literature made during the past year was furnished by the publication of the second volume of Professor Seward's *Fossil Plants.* The first volume of this work appeared in 1900, and, though we have had to wait so long for the second, its excellence amply atones for its delay. In the present volume the study of the fossil members of the Pteridophyta has been completed, the consideration of the Seed-plants being reserved for a third part. Thoroughly up to date, it deals fully with fossils of the Mesozoic and Tertiary age, as well as with the Carboniferous remains, and gives a large number of references to original papers, thus enabling any subject to be followed out in detail.

Its full descriptions of the important plants should prove very useful to students who are beginning the study of the fossil types. At the same time the scope of the book is a wide one, all the better-known forms being mentioned, and it will therefore appeal to all who study the Pteridophyta ancient or modern.

The consideration of the *Sphenophyllales*, which was begun in the first volume, is concluded by an account of the recently discovered fertile shoots belonging to that group. The *Psilotales* are considered in a separate chapter; the author prefers to retain the *Psilotaceæ* as a division of the Pteridophyta, including only *Psilotum*, *Tmesipteris*, and a few doubtful fossil forms, and does not unite them with the *Sphenophyllales*, as several writers have recently done.

Pages 30–279 are devoted to the *Lycopodiales*. As in the case of the other groups, the account of the fossil members of the class is preceded by a brief account of its recent members, in this case the genera *Lycopodium*, *Selaginella*, and *Isoetes*. By means of these and similar admirably selected and written sections, the consideration of the plants of the past is brought into close touch with the study of their modern descendants, and a much greater interest is imparted to the book than it would have possessed had it dealt entirely with fossils.

The Lycopods are treated very fully. The anatomy of the typical species, *Lepidodendron vasculare* Binney, is described in detail, and useful summaries of the anatomy of nine other species are given. Ulodendroid and Halonial forms are discussed, and the principal types of Lepidodendroid cones are described. The *Bothrodendreæ* are given a separate chapter, while the results of much modern work is incorporated in the chapters on *Sigillaria* and *Stigmaria*.

The second half of the book deals with the Ferns. The introductory chapter on modern ferns is a most interesting piece of work, particular attention being given in it to the orders of ferns most closely related to some of the fossil types. In the subsequent chapters the past history of the *Osmundaceæ*, *Matonineæ*, and other families is described and illustrated in a lucid manner.

Several of the groups of Mesozoic Leptosporangiate forms are nearly related to recent genera, but, as we go back to Carboniferous times, forms with sporangia of the Marattiaceous type appear to become dominant. Summaries are given of a number of the genera which have been instituted for some of these types.

A large number of the Palæozoic ferns had, however, little similarity to any of the modern forms, but exhibit many features which may be regarded as primitive. A considerable amount is known of the *Botryoptereæ* and *Zygoptereæ*, and they have been placed in a group to which various names have been given. Prof. Seward points out that not one of these names is altogether satisfactory, and proposes the new designation of *Cœnopterideæ* for this group. He thinks that the name *Primofilices*, which Arber introduced for them, implies that they were absolutely rather than relatively primitive.

The concluding chapter is on the various genera of fern-like plants of uncertain affinities, probably either ferns or Pteridosperms. While this chapter may present little to interest the general student of botany, it will be invaluable to those who wish to study the floras of the past. It gives a short critical account of those genera of fossil plants—such, for example, as *Glossopteris*—which entered so largely into the composition of ancient floras. These genera are founded almost entirely on structureless leaf-impressions, and are therefore often neglected by botanists, but we urgently need more information about them.

As in vol. i., we have at the end of the book a large bibliography of the works mentioned in the text. It contains about six hundred references to articles from very numerous sources, and cannot fail to be most useful to students and investigators.

The book is profusely illustrated with several hundreds of drawings and photographs. Most of them bring out very clearly the points of interest, but we could wish that some of them had not been reduced so much. There are few important subjects in the text which are not amply illustrated by figures.

The author is heartily to be congratulated on the way in which he has reviewed and summarized the enormous amount of material with which he has had to deal. Little that is really essential has been omitted, and compression has never been carried too far. It is also not a book written to support a theory, though many theories which the author holds are incidentally presented to the reader.

H. H. T.

A Text Book of Botany. By J. M. Lowson. Seventh Impression. (Fifth Edition.) Pp. viii., 607, 354 figs. in text. London: Clive, University Tutorial Press. 1910. Price 6*s*.

This book has been enlarged considerably since its first edition, but the general method and plan remain unchanged. The student is advised in the preface to read Part i. merely "in a general way"—a somewhat uninviting beginning. In Part ii. the Angiosperm is treated in detail, including morphology, physiology, and the characters of a few natural orders. Part iii. deals with Vascular Cryptogams and Gymnosperms in a series of types, together with some account of the homologies and relationships between these and flowering plants. This account is fairly clear, but its brevity, necessitated by the scope of the book, makes it somewhat misleadingly incomplete. This third part concludes with a chapter on Ecology. Part iv. comprises accounts of lower cryptogamous types, and Part v. deals with "Additional Natural Orders," concluding with "Test Questions" and a few practical hints. The type employed in the body of the book is tolerably good, but the small type of the numerous additional paragraphs is somewhat trying.

The details of elementary morphology are treated throughout in a clear and succinct manner, and the reader is assisted materially by the lucid and boldly-lettered diagrams. An industrious student with a good mechanical memory might readily master these details from this text-book, unaided by a tutor and without previous knowledge of the subject: the author has, without doubt, the knack of presenting facts intelligibly. There is, however, a lack of that organic continuity which we should welcome in a modern text-book; fact is too seldom, and at best too barely, associated with function; the subservience of structure and habit of the individual parts to the plant considered as a whole and as a living organism is not emphasized; the student's mind is centred wholly upon each detail as it is presented in its turn; he forgets the life to which the detail contributes its quota of service.

In this connection the isolation of physiology and its relegation to a couple of chapters is ominous. Even here the vital principles—notably those of energy and respiration, the keynote of every living organism—take a minor place and are veiled in a tangle of detail and an array of formidable experiments, the expression of the outward and visible signs, merely, of those principles. The examinee who is asked for an account of respiration will think more of Sachs' apparatus than of energy and metabolism. The vast importance of the water-current—of its continual motion, its entrances and its exits, and its consequent influence on the habit of plants—here suffers in a similar way. So, again, with photosynthesis; the immense part played by the green plant as the entrance-door of the sun's radiant energy into the organic world is unrevealed.

The chapter on Ecology has been added, doubtless to meet the requirements of the examinee. In this difficult field, where broad, vital, scientific principles are essential to the appreciation of the barest rudiments of the subject, we look vainly in chapter xviii. for any boldness in the display of those principles. Test questions 129 and 130, beginning respectively "Enumerate the . . . plants . . ." and "Write a list . . ." are significant: we should regret to find such in a public examination. The reader gains either a very misty idea, or none at all, of the plant association, that fundamental consideration which lies at the very root of truly scientific ecology; plant societies are named, but left undefined; the formation, the expression of the organic succession of associations within a uniform habitat, is not even mentioned. In this section the tutor, with whom we found that we could dispense in the study of morphology, will be needed sorely.

The systematic botany is dealt with in two portions isolated from each other and from the account of floral morphology; this is in keeping with the tendency to mechanical treatment which is to be deplored throughout the book. The description of the "horizontal" floral diagram is clearly portrayed; but the all-important longitudinal section of the flower, showing the relation of floral parts to the receptacle, that great factor in classification, is left practically unnoticed.

This text-book will teach the student many facts, but it will not make him think: if public examinations are to be memory-tests, the author will have rendered great service to a large and growing public—the examinee.

H. F. W.

Contribuzioni Diatomologiche, ix–xi. Achille Forti. Venezia, 1910. Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti. Anno acad. 1909–10, tom. lxix., parte seconda.

This publication is a continuation of the excellent series of contributions on Diatoms which have emanated from Dr. Achille Forti during the past few years. No. ix. is a most exhaustive account of the genus *Cerataulus*, in which the author summarizes, with copious critical notes, all that is known concerning the systematics and geographical distribution of this rare genus. No. x. is an account of a number of recent and subfossil Diatoms from Abyssinia. No. xi. is an extensive list of Diatoms found in certain calcareous tertiary deposits at Bergonzano and Marmorito, in Italy. The three contributions are illustrated by nine photographic plates of very great merit, which add materially to the value of the work. All scientific students of Diatoms will welcome further contributions from the same author.

G. S. West.

BOOK-NOTES, NEWS, &c.

We learn with very great pleasure that the Rev. E. S. Marshall has been elected an Honorary Fellow of the Botanical Society of Edinburgh, "in recognition of his great services to British Botany." How great these services have been none know better than the readers of this Journal, to which Mr. Marshall has been a valued and constant contributor for more than twenty-five years, and we are sure that not only they, but the many others who have benefited by Mr. Marshall's knowledge, always placed freely at the disposal of fellow-workers, will join us in congratulating him in the distinction—for the number of British Honorary Fellows is limited to six—which has been conferred on him. When it is remembered that Mr. Marshall during all these years has been engaged in active clerical work, some notion may be formed of the energy and perseverance which are salient features of his character. We hope it may be long before it is necessary to give some account of his botanical work; those who are fortunate enough to possess plants from his herbarium know that in addition to his critical and local knowledge Mr. Marshall is conspicuous among British botanists for the admirable care with which his specimens are selected and dried. *Ad multos annos*!

At the meeting of the Linnean Society on January 19th, Mr. C. H. Wright read a paper on the Flora of the Falkland Islands, based upon a collection made by Mrs. Eleanor Vallentin—whose father (Mr. W. Wickham Bertrand) was one of the earliest settlers in the West Falklands—but expanded to enumerate all the plants recorded from the Falklands. An endeavour has been made to define the distribution of plants in the islands and to show what changes have taken place in the flora since the publication of the *Flora Antarctica* in 1847. The plants are chiefly of dwarf habit, often with aromatic leaves, and conspicuous, often scented, flowers, which are produced chiefly between November and January. The earliest to appear is *Draba funiculosa* Hook. f., in September. The extermination of the fox (*Canis antarcticus*) has rendered possible the keeping of sheep, with the result that plants previously common have now become rare; amongst these are the Tussac Grass (*Poa flabellata* Hook. f.), Cinnamon Grass (*Hierochloe redolens* R. Br.), and Blue Grass (*Agropyron repens* Beauv.). *Primula farinosa* var. *magellanica* Hook. f., while still abundant, is much dwarfed in those islets where sheep have been introduced. *Veronica elliptica* Forst. f. attains a height of 7 feet, and is the tallest plant on the islands, the next being *Chiliotrichum amelloideum* Cass. (the Fâchima plant). *Azorella cæspitosa* Cav. (the Balsam-bog) forms hard masses up to 10 ft. long and 4 ft. high, which rapidly decay on being wounded. The flora shows a great affinity with that of Magellan and Chile.

At the meeting of the same Society on February 2nd, Dr. Jackson showed a series of lantern-slides, explaining the genesis of the portrait of Carl von Linné, painted by Alexander Roslin, and the various copies, including the original three-quarter length portrait now at Versailles, though in a somewhat poor condition; and showing that the Lapland drum in the Hoffman portrait, and on the lap of the foreground figure in the engraved title-page of the *Flora Lapponica*, is a magic drum, and not a botanic press. Mr. S. T. Dunn read a paper entitled "A Revision of the Genus *Actinidia* Lindl." The genus comprises twenty-four climbing shrubs with a peculiar floral structure. The name, which is derived from the Greek word ἀκτίς, a star, refers to the remarkable arrangement of the numerous styles, which radiate, like spokes of a wheel, from the summit of the ovary. The appearance is striking, and is only paralleled by the gynœcium of *Dillenia*. The species inhabit the whole of the far east of Asia, from Japan to the Malay Peninsula, and extend to Sumatra and Java. The genus has presented some difficulty in the separation and grouping of its species. This difficulty is to a great extent removed when the facts of the distribution of the various species are collected and compared, for the genus is found to be naturally divisible into sections, which present a well-marked gradation both in floral and vegetative characters, as well as in geographical range. The question of systematic position has from the beginning been an open one—Bentham, in Bentham and Hooker's *Genera Plantarum*, placing it in *Ternstrœmiaceæ*; while Gilg, in Engler and Prantl's *Pflanzenfamilien*, makes a separate section for it in *Dilleniaceæ*. On a comparison of the actual characters by which it differs from each, it is found that in its versatile anthers, its numerous seeds, and moderate (not minute) embryo it differs from all known *Dilleniaceæ*; while the only character by which it differs from all *Ternstrœmiaceæ* is the presence of raphide-bearing cells. Its close connection with *Saurauja* and *Clematoclethra*, genera still more closely allied with *Ternstrœmiaceæ*, taken in connection with the above evidence of its leaning towards that Natural Order, seems to support Bentham's view.

At the meeting of the Linnean Society on March 2nd, 1911, Mr. E. M. Holmes showed a specimen of *Griffithsia globifera* J. Ag. from Milford Haven; Mr. Cotton remarked on the spread of some of these alien algæ in our waters. Mr. H. W. Monckton thereafter showed a series of lantern-slides from photographs taken during his visit last autumn to Sweden as a delegate on behalf of the Society to the International Congress of Geologists, especially those taken at Upsala, some of which showed places connected with Carl von Linné, including a front view of his house in the old Botanic Garden. Dr. B. D. Jackson then showed a supplementary series of lantern-slides, chiefly from old prints, concerning the history of the old Botanic Garden. He stated that when Linné and Rosén had exchanged Chairs in January, 1742, and the former had thereby become prefect of the garden, he took immediate steps to rearrange the garden, provide glass-houses, and rebuild the house attached, which belonged to the prefect. The last slide showed the old poplar close to the entrance, the only specimen which can be regarded as coeval with Linné, inasmuch as the laurels and a few other veterans had been transported to the new botanic garden early in the nineteenth century.

The twelfth volume of the *Proceedings of the Washington Academy of Sciences* is mainly occupied by a monograph of the Lichen Flora of the Santa Cruz Peninsula, California, by Albert W. T. C. Herre, in which the following new species are described: *Verrucaria melas*, *V. Stanfordi*, *Cyphelium occidentalis*, *C. Andersoni*, *Bacidia ioessa*, *Acarospora Hassei*, *A. arenosa*, *Placynthium dubium*, *Lecania Dudleyi*, *Lecidea pacifica*; and a new genus, *Zahlbrucknera* (*Z. calcarea*). Another botanical paper is that on the *Polytrichaceæ* of Western North America, by T. C. Fryes, with numerous illustrations.

Annual and Biennial Garden Plants, by A. E. Speer (Murray, 7*s.* 6*d.* net), dealing with "their value and uses, with full instructions for their cultivation," is the most recent addition to the flood of garden books which has been pouring out for several years and is apparently still unexhausted. It is a widely spaced, well-printed volume, alphabetically arranged, with numerous, often very poor and scrappy, illustrations by the author; some of these, indeed,—e. g. *Argemone grandiflora*, *Godetia*—give little idea of the plant, and others, such as Foxglove, are taken from very inadequate specimens. Many of the plants included are of course so common that no description is necessary, but of others the descriptions seem very inadequate. A good deal of space is occupied by what are supposed to be English names, but does anyone ever call *Schizanthus retusus* "Notched Fringe-flower" or *Œnothera biennis* "Large Kampion"? and can "Cotgrave" be a name for the Sweet William? Some attempt—not always successful, e. g. "*Gri'ffithi*" "*La'blab*"—is made to give the proper pronunciation of the Latin names; misprints are numerous—"*semplerflorens*," "Barbery." The cultural directions seem full and useful.

We are glad to see that *Flowers of the Field*, as enlarged by Mr. Boulger (S.P.C.K., 7*s.* 6*d.*), has gone into a new edition—the thirty-third of the work—to which has been added a biography and portrait of the original author, the Rev. C. A. Johns. First published in 1853, the book has been to many botanists the introduction to a knowledge of British plants; in its present form it has been once more carefully revised, and includes the latest additions to the British list, the nomenclature adopted being in accordance with the rules of the Vienna Botanical Congress, as confirmed last year at Brussels. We still regret that the craze for colour which at present dominates popular taste has necessitated the introduction of a number of coloured plates, which add materially to the weight of the book though but little to its usefulness; poor as some of these are, they are however preferable to those which appear in another publisher's issue of the work, to which the S.P.C.K. edition is in every respect superior.

The small (8th) part which concludes the first volume of Mr. Williams's *Prodromus Floræ Britannicæ* contains the completion of the *Rhodoraceæ* and the *Pyrolaceæ*, with an introductory note and a conspectus of the orders and families of British plants. In plan and treatment it differs in no way from the preceding portions, which have been noticed at length in these pages. There is the same originality and the same wealth of out-of-the-way and interesting information, as well as the same disregard for accepted rules and conventions, *e.g.*, in the substitution of *Uva-ursi* for *Arctostaphylos*, as to which see this Journal for 1910, pp. 183, 206, on the latter of which Dr. Jackson shows that the name, rendered as above by Mr. Williams, was originally written as two words and is therefore "excluded by analogy." The author acknowledges a grant from the Royal Society in aid of the publication of the work, the next part of which will be "published as soon as circumstances permit."

Mr. James Kynoch (8 College Road, Brighton) has published (price 6*d.*) a fourth and enlarged edition of *Wild Flowers of Barmouth and its Neighbourhood*, in which has been incorporated the list published by the Rev. T. Salwey in 1863. This indeed constitutes more than half the book and its principal value; it is more extensive than the title of the book implies, as it includes lists of ferns, mosses, hepatics and algæ. Although it can hardly claim to be critical—*Erythræa latifolia* is given as a Barmouth plant—and is erratic in its spelling, the list is interesting and suggestive; it has long been out of print, and Mr. Kynoch has done well to render it accessible.

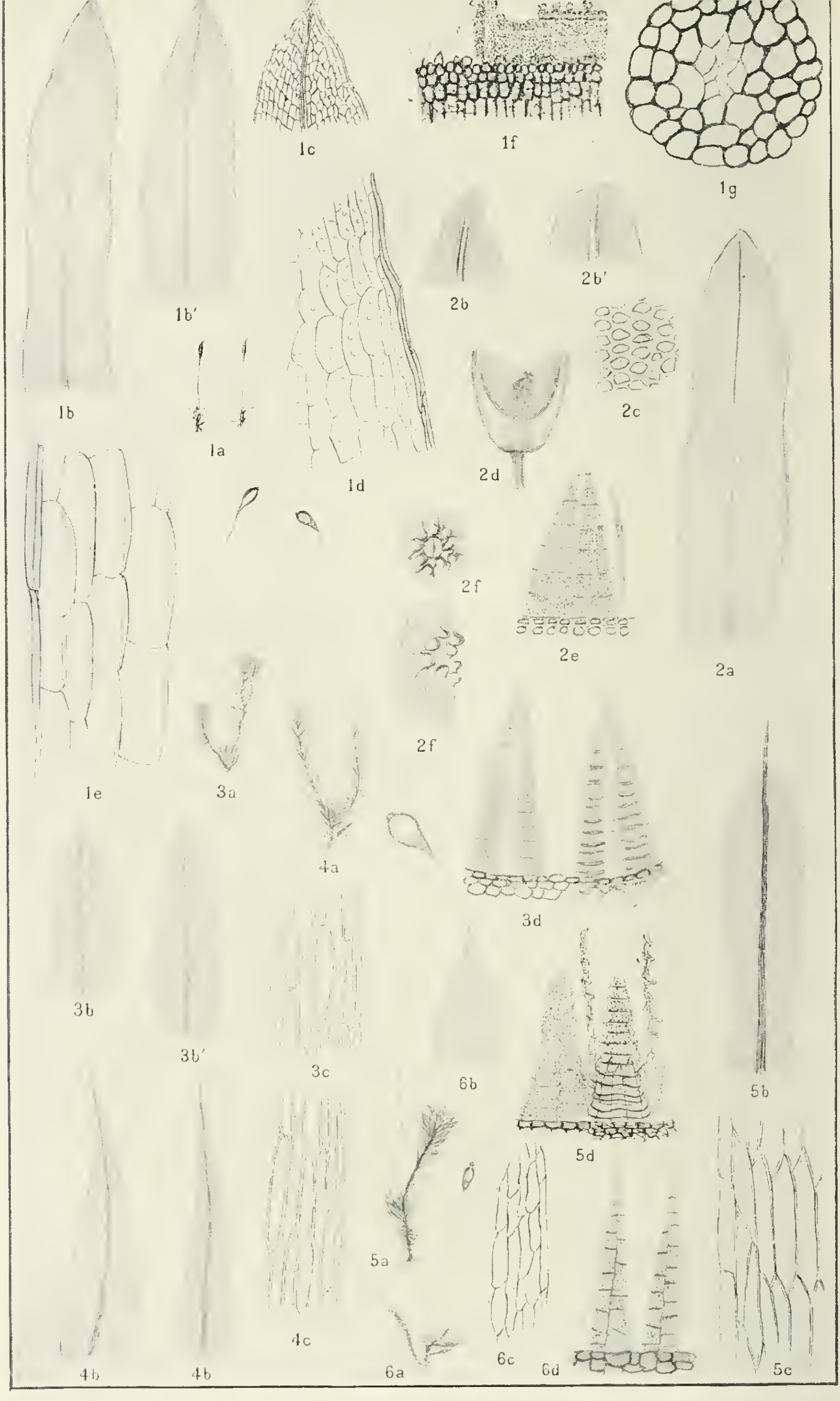
Messrs. Routledge announce the publication of a volume on *The Alpine Plants of Europe*, by Mr. H. Stuart Thompson, which we may anticipate will be a useful addition to the numerous works already devoted to the same subject. Mr. Thompson possesses two qualifications often lacking to compilers of such books—botanical knowledge and an intimate acquaintance with the plants in their natural habitats—and these qualifications cannot fail to give a special value to his work.

The last part (Feb.–July 1910, published Feb. 1911) of *The Essex Naturalist* contains a Report on the Lichens of Epping Forest by Mr. R. Paulson, some notes on the coast-flora of the county, by Mr. J. C. Shenstone, and an interesting and exhaustive biography of Dr. Benjamin Allen of Braintree (1663–1738) who, although not himself a botanist, was a correspondent of Ray and Dale.

The *Selborne Magazine* for March contains, besides the paper on introduced plants at Paisley, from which we give an extract on p. 126, a useful article on Botanical Photography, by Mr. P. F. Visick.

By direction of the London County Council, a tablet has been affixed to No. 32, Soho-square (the National Hospital for Diseases of the Heart), where for many years Sir Joseph Banks lived.

We regret to announce the death of Mr. W. A. Clarke, of Oxford, and of Colonel Beddome, whose name was for many years intimately associated with Indian botany. Notices of both will appear in an early issue.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H. N. Dixon del. HYOPHILOPSIS, &c. West, Newman proc

HYOPHILOPSIS, A NEW GENUS OF *POTTIACEÆ*,

WITH FURTHER CONTRIBUTIONS TO THE BRYOLOGY OF INDIA.

BY H. N. DIXON, M.A., F.L.S.

(PLATE 513.)

SINCE my last article on Indian mosses in this Journal (Dec. 1910), I have received for study several small collections. These include a further collection by Mr. Sedgwick, mostly about Fort Purandhar, in the Poona District of the Western Ghats; a small number collected by Mr. C. E. C. Fischer, Deputy Conservator of Forests in Coimbatore, on the Attapadi Hills, Mysore District, in 1910, and sent to me by Rev. E. Blatter, S.J. While from Northern India Mr. L. B. Hall, F.L.S., has sent me a few mosses collected by Miss Craig at an altitude of about 7000 ft., near Ghoom, in the Eastern Himalayas. And lastly, Mr. W. R. Sherrin has sent me the packing of skins in the British Museum of (*a*) a flying squirrel from the Naga Hills, Assam, and (*b*) a squirrel from Sikkim, each containing some interesting species. These, as well as those mentioned in my last article, are dealt with here.

Hyophilopsis Card. & Dixon, gen. nov. Pottiacearum.

Stirps parva, gregaria, habitu inter Pottias et Hyophilas ludens. Caulis perbrevis, subsimplex, fasciculo centrali latiusculo, male definito. Folia oblongo-subspathulata; areolatio perlaxa, e cellulis magnis subhexagono-rectangularibus pellucidis parce papillosis instructa, basilaribus laxissimis, marginalibus in 1–3 stratis angustissime linearibus, limbum distinctum angustum efformantibus. Theca et seta facie omnino Hyophilæ. Annulus latus, persistens. Peristomium rudimentarium, e membrana annulari lutea papillosa perangusta intra annulum recondita, dentibus brevissimis, fragmentariis, papillosis aurantiacis sæpe obsoletis, vix supra orificium exsertis instructum.

H. entosthodontacea Card. & Dixon, sp. nov. (Tab. 513, fig. 1.) Dense gregaria, viridis. Caulis perbrevis, simplex vel subsimplex; in sectione transversa rotunda, fasciculo centrali majusculo, reti reliquo homogeneo fere, laxo, parietibus firmis subincrassatis, rubris, cellulis externis omnino similibus. Folia inferiora parva, tenuissima, superiora rosulata, multo longiora, 2–3 mm. longa, latitudine perinæqualia, sæpe anguste oblongo-sublingulata, nunc elongate obovata vel subspathulata, *acuta vel subobtusa nec acuminata*, concava, integra vel sub apice obscure obtuse subdenticulata, *flaccidissima*, *tenuia*, pellucida vel chlorophyllosa, marginibus planis; costa tenuis, in summo apice soluta, in sectione duces 2, fasciculum comitum, fasciculum cellularum stereidearum vel substereidearum dorsalem, cellulas magnas inanes ventrales exhibens. Areolatio *perlaxa*, cellulæ superiores subhexagono-rectangulares, irregulares, circa 30 μ longæ (apud $\frac{2}{3}$ folii longitud.) et 8–12 μ latæ, apicem versus breviores, inferne sensim elongatæ, *basilares* (*dimidiam partem folii occupantes*) *laxissimæ*, elongate rectangulares, perpellucidæ; superiores pagina dorsali *papillis majusculis 2–4, seriatim dispositis*, pellucidis plerumque inconspicuis præditæ, parietibus omnibus tenuissimis; cellulæ ad marginem 2–3 seriebus angustissime lineares, *limbum perangustum optime definitum flavescentem per totum folii ambitum* efformantes. Seta ad 1 cm. longa, inferne rubra, superne flavida; theca *breviter cylindrica vel angustissime elliptica*, castanea, collo perbrevi distincto, operculo rostrato, tertiam partem thecæ æquante. Calyptra cucullata, sæpius scaberula. Exothecii cellulæ regulares, rectangulares, in seriebus longitudinalibus dispositæ, orificium versus nonullæ aliquot breviores, vix quadratæ; stomata sat numerosa, magna. Annulus latus, bene evolutus, ut videtur longe persistens. *Peristomium generis.* Sporæ 8–10 μ, læves, virides. Dioicum, vel potius revera rhizantoicum; fl. masc. terminales, in caulibus cum femineis intermixtis, ætate propriis, imprimis verisimiliter e caulibus fertilibus ortis sitæ.

Hab. On walls and mortar, very common, Purandhar, Poona District, Oct. 1910; leg. Sedgwick (no. 119) c. fr.

A very distinct plant, and one somewhat difficult to place in *Pottiaceæ*, the fruiting characters being very nearly those of *Hyophila*, while the areolation is rather Pottioid. The capsule, however, is not gymnostomous, as the basal part of a peristome is quite distinctly present, though reduced to very small dimensions. The leaves, bluntly pointed, extremely thin and pellucid, with lax thin-walled cells and a narrow, distinct, not thickened border, are, at first sight, suggestive of *Entosthodon*, whence the specific name. The papillæ, of course, at once distinguish them, but they are frequently inconspicuous, and often (except in profile) masked by the chlorophyll; in their well-developed condition and on empty cells, on the other hand, they are very distinct, and their arrangement a very unusual one in this family; the only close resemblance that I remember seeing being in the lower cells of one or two New Zealand species of *Tortula* (e. g. *T. Petriæi* Broth. and *T. rubra* Mitt.).

ANŒCTANGIUM STRACHEYANUM Mitt. Earth-banks, Fort Purandhar, Poona District, May, 1910; leg. Sedgwick (nos. 81, c. fr.; 89, a dense, yellow, sterile form, with closely curled leaves when dry; 106, c. fr., a vivid green form; 107, a rather robust, sterile form). Near Binsar, Almora, 1910; leg. Miss E. Shepheard (no. 14), c. fr.

A. WALKERI Broth. On stones, Panchgani, W. Ghats, Feb. 1909; leg. Sedgwick (no. 44), st.; teste Brotherus. The cells are very short quite to base, only a very few at extreme base next the nerve shortly rectangular.

A. THOMSONI Mitt. Binsar, Almora, 1910; leg. Miss E. Shepheard (no. 12), c. fr. A robust plant, closely resembling in habit *Trichostomum mutabile* Bruch. It should be noted that Wilson's name (*A. crispulum*) cannot be maintained, being only a *nomen nudum*.

A. BICOLOR Ren. & Card. "Taulea, India, 12–13,000 ft., Aug. 7, 1883; leg. Duthie, no. 4099" in Herb. Mitt., c. fr. An unnamed specimen with the above labelling, sent from Mitten's herbarium unnamed, agrees quite well with an original specimen of *A. bicolor* (Sikkim; leg. G. A. Miller, 1901), kindly sent me by Mons. Cardot; Duthie's plant being only a little more slender and laxer in foliation.

A. DUTHIEI Broth. (*Molendoa Duthiei* Broth. olim). Among some unnamed Indian specimens of *Anœctangium* put into my hands for study from Mitten's herbarium, were three labelled as follows:—"6342*a*, *Anœctangium versicolor*, Pahang Gadh, India, July 19, 1886; leg. J. Duthie"; "6342*b*, *Anœctangium obtusatum*, India; leg. J. Duthie"; "6242*c*" (probably a slip for 6342*c*), "*Anœctangium*, India; leg. J. Duthie." The two specific names are no doubt MS. names of Mitten's. The numbering, together with the absence of particulars in the labelling of the last two, would seem to imply that they were collected all at one time. At first sight there is a considerable difference between (*a*) and (*b*), the latter being of denser growth, and the leaves being, as the name implies, for the most part obtuse. Closer examination, however, shows that too much dependency must not be placed on this character, for the leaves in (*b*) are often acute and are very variable, while in (*a*) they are equally variable, and if more frequently acute are also at times quite obtuse; and the structure and form of capsule, &c., being identical, they must be held to belong to one species.

The plant marked (*c*) is certainly closely allied, and, I think, without doubt identical, although the areolation is a little larger and much more pellucid. The capsule agrees, and is marked in all three specimens by a tendency to an asymmetrical form, especially in the immature condition. The lid, which is extremely long-beaked in (*a*), is usually shorter in (*b*) and (*c*), but varies, and apparently the shortness is, in some cases at least, due to accidental causes. A further plant of Mitten's labelled "India; leg. Duthie," is also a still more compact and obtuse-leaved form of the same thing.

I have compared these with *Anœctangium Duthiei* Broth. (Alampi-la, coll. Duthie, no. 12,717) in the British Museum, original specimens of this species, and I have little doubt that they are all referable to that species. The leaf structure agrees exactly, but the Alampi-la plant has shorter, denser leaves than the laxer forms. The basal cells, the basal margin regularly recurved (almost always on one side only), the somewhat asymmetrical capsule, all agree, and there is really no difference between *A. Duthiei* and any of the above plants, except in the habit, which in Mitten's (*c*) is indeed almost if not quite identical; and in the pointing of the leaves, which, as I have stated, is quite a variable feature.

The fruiting characters would seem to support the view that it is an *Anœctangium* rather than a *Molendoa*.

This extends the distribution of *A. Duthiei*, as I suppose, some distance eastward, and also shows it to be a variable plant. In this connection it is necessary to compare with it *A. laxum* C. M., Schensi, China, which I have examined in the British Museum (leg. Giraldi, det. C. Müller, no. 2078). At first sight this differs markedly from *A. Duthiei* in the excurrent nerve and cells more obscure, very papillose, and the back of the nerve papillose. But the lower leaves agree exactly with the Indian plant, the cells vary in size and distinctness, as they do in *A. Duthiei*. The back of the nerve also varies, and in Mitten's plant it varies from smooth to distinctly papillose (*A. Duthiei* is described as nervo . . . dorso lævi), so that I do not think this can be held to have any importance. The leaf margin in the Chinese plant, while normally plane, is very occasionally slightly reflexed below. The basal cells are shorter, but otherwise agree; as also does the capsule (not at all, as described by C. Müller, "angustissime cylindrica"), so far as the condition permits of comparison. The plants are certainly very nearly allied, but in view of the excurrent nerve, almost plane margins, and shorter basal cells of the Chinese plant, I should hesitate to unite them, unless further investigation should result in the discovery of intermediate links.

Orthotrichum (CALYPTOPORUS) **Griffithii** Mitt. MS., sp. nov. (Tab. 513, fig. 2.) Corticola; dense cæspitulosum, *pumilum*, vix ·75 cm. altum. Folia densa, erecto-patentia, *plerumque obtusa, rarius subobtusa*, late oblonga, ad 3 mm. longa, ad ·75 mm. lata, marginibus ad basin breviter anguste recurvis, *superne planis, sæpe omnino fere planis*; costa tenuis, profunde canaliculata, dorso valde prominens. Cellulæ incrassatæ, subrotundo-ellipticæ, 8–10 μ latæ, humillime papillosæ vel omnino fere læves, basilares paullo elongatæ, anguste lineares. Autoicum. Vaginula pilosa vel subnuda; calyptra haud inflata, parce pilosa vel subnuda. Seta perbrevis, vix ·5 mm. alta, e summa ochrea parum excedens. Theca *parva, immersa vel subemergens*, ad 2 mm. longa, madefacta elliptica, *collo brevissimo*, circa quartam partem thecæ æquante, *apud basin nullo modo in setam decurrente, sed abrupte rotundo*; siccitate apud orificium angustata, superne leniter plicata, vetustate (vacua) vix sub ore constricta, cum collo paullo angustato subcylindrica. Striæ 8, *debiles, e 3–4 tantum seriebus cellularum* parietibus longitudinalibus incrassatis instructæ, vix ad medium thecæ productæ, luteo-aurantiacæ; intervallorum cellulæ *in seriebus pluribus* (8–12) *dispositæ*, pallide luteæ, rectangulares parietibus tenuioribus; stomata immersa, numerosa, *per totam ⅔-partem inferiorem thecæ sparsæ*; cellulæ circumsistentes *valde protuberantes, stomata tamen plerumque minime obtegentes*. Operculum rostellatum. Peristomium fuscum, dentes in paria 8 connati, vetustate medio fissi, dense papillosi, papillis nunc irregulariter nunc in striolis verticalibus vel obliquis dispositis; cilia 8, fusco-aurantiaca, filiformia, solidiuscula, nonnunquam papillosa. Sporæ 16–24 μ, aurantiacæ, sublæves.

Hab. "On trees, Oongar, 5000"; Mitten in sched.

Allied to *O. Schimperi* Hamm., *O. pumilum* Sw., and *O. microcarpum* De Not. In the form of the capsule base it is very distinct, and only comparable to *O. Schimperi*, from which it differs, as from the other two species, in the slightly larger spores, and especially in the bands of the capsule, which, in the allied species, are broad, wider than the intercostal spaces, and composed of 4–5 longitudinal series of cells; in *O. Griffithii* they are very faint and narrow, often composed (except at the extreme orifice of the capsule) of one to two rows of indistinctly marked cells only, and the intervals of thin-walled cells very much wider. The leaves also are very different in form and texture, the margins but little revolute, and the cells incrassate. *O. pumilum* differs in the form and recurved margins of the leaves, and especially in the more tapering base of the capsule. This latter character also separates it from *O. microcarpum*, which also has the overlapping cells of the stomata scarcely protuberant.

ORTHOTRICHUM sp. A specimen from Mitten's herbarium, labelled "209, Nubra, 11,000, 1 Sept. 1848" in Mitten's hand, is, I have very little doubt, an undescribed species. It is closely allied to *O. speciosum*, but the only matured capsule shows a marked departure from that species in the structure of the capsule. The exothecium cells in *O. speciosum* are very regularly arranged in longitudinal rows, regularly rectangular-oblong in form; in Mitten's plant these cells are irregular, both in form and arrangement, being of various shapes, from oblong to triangular and rounded. The calyptra is also quite naked, the capsule scarcely striated. In view, however, of the scanty material in poor condition, I do not venture to describe it as new, but it is a species for which a look-out should be kept among *Orthotricha* from the higher altitudes in the Himalayas.

O. CRENULATUM Mitt. An unnamed specimen in Mitten's herbarium, labelled "Keris Shayuk Valley, Tibet, Dr. Thomson," is certainly this species, mixed with *Drummondia Thomsoni* Mitt.; it is probably part of the original gathering. The ribs of the capsule consist each of 6–8 rows of cells; the stomata are immersed, but the overlapping cells, instead of being very protuberant and greatly hiding the guard-cells, as in *O. Sprucei*, are scarcely prominent, and leave the guard-cells almost uncovered. The leaf-cells also are more distinctly papillose. It is no doubt a good species, differing in the denser shorter habit, the less emergent capsules, and the narrower, more concave leaves, as pointed out by Mitten, as well as in the above characters.

A further specimen of *Orthotrichum* from Mitten's herbarium, from the Nilghiri Mts., and probably collected by Strachey, is named *O. revolutum* Mitt. MS. It is very closely allied to *O. anomalum*; in fact, except that the stomata are almost entirely covered by the overlapping cells, and are scattered about the middle of the capsule, I can find no difference. But the material is scanty and poor, the peristome much destroyed, and it is perhaps best left undetermined.

Still another plant, labelled (in a hand I do not recognize) "Mungalin,* Sept. 1887, alt. 1000′; only a fragment on a schist block," contains two species, one of them similar to *O. rupestre*, but showing a very remarkable development of peristome, the teeth being almost covered to half their length with irregular lumps of preperistome. The material is, however, too poor to found a species upon; but it may be hoped that the plant will be rediscovered.

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* ? Mungaliri; the writing is indistinct. I have not been able to trace this locality.

AULACOMITRIUM. A scrap was sent for study, labelled in Mitten's hand "Nilgiri, Beddome, 195 pt. c. *Thyridium Indicum.*" I have compared this carefully with original specimens of *Aulacomitrium humillimum* Mitt. (Japan; leg. Maingay, det. Mitten, Aug. 1891) at Kew, and the two plants are certainly identical. I asked Mr. R. S. Williams to be kind enough to examine Mitten's specimens of *Thyridium indicum*, to see if any trace of an *Aulacomitrium* occurred there, but he replied:—"Under 195, Beddome, I find a sterile plant named *Thyridium indicum* Mitt. MS., of which there are three separate specimens, all alike, and no mixture of any sort in the packet. It is very easy to believe, however, as you suggest, that so small a bit of moss, as is the specimen of *Aulacomitrium*, might have been accidentally mixed with the *Thyridium*, and really belong to a very different region." Moreover, the scrap so labelled appeared in every particular of condition identical with the type-specimens of *A. humillimum*, and I think the conclusion is inevitable that it is a fragment of the Japanese plant which had casually become placed with the *Thyridium*.

MACROMITRIUM PERROTTETII C. M. Binsar, Almora, 1910; leg, Miss E. Shepheard (no. 18), c. fr. *Macr. squarrulosum* C. M. would appear to be nearly allied to *M. Perrottetii*, but I have not been able to see an authentic specimen of the former. Mons. Cardot writes that a specimen from the Nilghiris (leg. Perrottet), so named by Bescherelle, does not agree with C. Müller's description, in that the leaves are not spreading in the dry state, and does not therefore appear to be correctly named; it agrees with Miss Shepheard's plant, and both only differ from *M. Perrottetii* in having the leaves a little smaller, and the seta shorter. I have examined *M. Perrottetii* at Kew, where it is well represented, and shows considerable variation in size and length of seta, several specimens being quite identical in these respects with the Binsar plant, e. g. "No. 224, Herb. Ind. Or. Hook. & Thoms., Chongtoom, Sikkim, 9000 ped., J. D. H." No. 239 in the same set (Nunklow, Khasia, 5000 ped., H. & T.), it may be mentioned, is something quite different, and incorrectly named. It is also perhaps worth noting that the specimen of "*M. squarrulosum* Müll., Perrottet, Neilgherries," in Herb. W. P. Schimper, at Kew, is certainly incorrectly determined, being a species of quite a different affinity, with leaves curled when dry. The distribution of *M. Perrottetii* is from the Sikkim Himalaya to Ceylon.

M. ANGULOSUM Thw. & Mitt. Nuwara-Eliya, near Galle, Ceylon, 1898; leg. J. H. Darrell (no. 135), c. fr.

M. SULCATUM (Hook. & Grev.) Brid. On stones, Panchgani, Feb. 1909 (no. 34), st.; and on trees, Mahableshwar, Jan. 1909 (no. 58), c. fr.; leg. Sedgwick.

Pohlia rigescens Broth. (*Webera rigescens* Mitt.). Ghoom, Himalayas, alt. 7000 ft., 1910; leg. Miss Craig (no. 6), c. fr. One or two stems of this apparently rare species.

Brachymenium (Dicranobryum) **Fischeri**, Card. & Dixon, sp. nov. (Tab. 513, fig. 6.) *Pusillum*, dense cæspitosum, subnitidum, viride, ætate pallidum. Caulis perbrevis, innovationibus *julaceis*, foliis *nunc densissime nunc laxius imbricatis*, vix 5 mm. longis, tenellis. Folia *minuta*, vix ·75 mm. longa, ·3 mm. lata, *cordato-ovata, acuta nec acuminata*, concava, marginibus integerrimis, omnino planis vel ad infimam basin angustissime obscure recurvis; costa validiuscula, in cuspidem longiusculam subintegram patulam excurrens. Rete chlorophyllosum, e cellulis subrhomboideis, 25–35 μ longis, 8–10 μ latis, parietibus pertenuibus instructum, marginalibus angustioribus, elongate oblongis, basilaribus laxe rectangularibus. ? Dioicum. Seta tenuis, pallide rubra, 1–1·5 cm. alta. Theca *erecta, symmetrica, parva*, vix 2 mm. longa, collo *brevi, in setam subabrupte defluente*, superne latior, sicca sub orificium *breviter distincte angustata.* Calyptra parva, vix sub orificium producta. Exothecii cellulæ irregulares, parietibus crassiusculis, orificium versus multo angustiores. Peristomii dentes inferne saturate aurantiaci, superne pallidi, lanceolati, intus altiuscule lamellati, dorso minutissime papillosi, *suturis horizontalibus æque ac linea media validis*; endostomium liberum, pallide aurantiacum, corona basilaris mediam partem dentium vel paullo altius attingens, processus rudimentarii. Sporæ minutæ, 10–12 μ. Operculum conicum, *siccitate ore latius.*

Hab. Closely intermixed with *Philonotis imbricatula* Mitt. on rocks, Muttikulam Gap, Attapadi Hills, Coimbatore, alt. 3100 ft., Sept. 1910; leg. C. E. C. Fischer (no. 4), c. fr.

Closely allied to *B. Borgenianum* Hampe, of Madagascar and Mauritius, but having the leaves wider above and not or scarcely acuminate, the cells slightly narrower, the nerve more longly excurrent, the capsule smaller and shorter, and in proportion wider. *B. squarrosulum* Card., a recently described American species, is also near it, but has the capsules inclined and somewhat asymmetric, and considerably larger. *B. Walkeri* Broth. has the seta longer, and the capsule much longer, and with a long narrow tapering neck.

The capsule is noticeable in the dry state from having the orifice much contracted, being narrower than the base of the operculum, and so forming a sort of neck between this and the expanded part of the sporangium.

B. turgidum Broth. Mahableshwar, 1909 (nos. 64, 65); Panchgani, 1909 (no. 66); on *Euphorbia*, Fort Purandhar, 1910 (no. 84); all c. fr.; leg. Sedgwick. No. 64 has the capsules a little less turgid and more erect than in previous gatherings, and the seta longer; (65) has both forms of capsule, with the longer seta; (84) has the leaves somewhat longer and slightly falcate.

B. Walkeri Broth. Stones, Panchgani, Feb. 1909; leg. Sedgwick (no. 52), c. fr. Det. Brotherus.

Anomobryum cymbifolium (Lindb.) Broth. Mahableshwar, Jan. 1909; leg. Sedgwick (no. 37), st.

Bryum (Areodictyon) **sahyadrense** Card. & Dixon, sp. nov. (Tab. 513, fig. 5.) Dense cæspitosum, vix 1 cm. altum, *rufo-variegatum, nitidum.* Caulis parce ramosus, inferne laxiuscule, superne magis conferte subcomose foliosus. Folia *elongate oblongo-ovata subspathulata, acuta, nec acuminata,* perpellucida, marginibus omnino planis, *integerrimis,* costa *valida, pulchre ruberrima,* in cuspidem *longam strictam* excurrens. Areolatio anguste rhomboidea, cellulæ 75–100 μ longæ, 10–12 μ latæ, marginem versus vix angustatæ; rete basin versus elongatum, cellulis rectangularibus, infimis in seriebus pluribus sæpe brevioribus, subquadratis; omnibus *echlorophyllosis perpellucidis,* parietibus pertenuibus. ? Dioicum (fl. masc. haud inventi). Flos femineus nunc lateralis, nunc terminalis inter ramulos dichotomos; foliis comatis, majoribus, magis acuminatis. Seta 1·5–2 cm. alta, rubra, superne flexuoso-curvata, theca inclinata vel horizontalis, *majuscula,* 3–4 mm. longa, 1–1·25 mm. lata, *turgide pyriformis collo longiusculo in setam sensim defluente,* submicrostoma, operculo breviter conico. Annulus latus. Exothecii cellulæ irregulares, parietibus firmis subincrassatis *collenchymaticis.* Peristomii dentes *pertenues, pellucidi nec colorati, late lanceolati,* circa 1–1·25 mm. longi, ad basin ·35–·4 mm. lati, subobtusi, marginibus *valde irregularibus, per totam longitudinem papillis quasi ciliolatis,* facie dorsali ubique dense minute papillosi, juxta basin *transverse vel oblique striolati*; sutura media angulata, æque ac suturæ transversæ, pertenues, ægre discernendæ; facie ventrâli superne conferte inferne parce grossiuscule papillosi, suturis horizontalibus circa 16 tenuibus bene distinctis humilibus notati vix lamellati, unaquaque sutura serie horizontali papillarum ornata. Endostomium *aurantiacum,* membrana basilaris circa quartam partem dentium æquans, parce papillosa; processus dentes *plus minusve superantes,* angustissime lineares *solidiusculi pernodosi,* aliquando hic illic irregulariter longius appendiculati, sæpe papillosi, ciliis interjectis 2–3 rudimentariis. Sporæ 20–27 μ, punctulati.

Hab. Rocks, Purandhar Fort, Poona District, Oct. 1910; leg. Sedgwick (nos. 114, 111), c. fr. Derivation from Sahyádri, the vernacular name for the Western Ghats.

A distinct and very interesting species, in its vegetative characters somewhat resembling *B. ghatense* Broth. & Dixon (v. infra), but marked by the longly excurrent vinous red nerve and larger leaves, while the peristome structure is entirely different, and, indeed, very striking. (Fig. 5*d* is drawn on too small a scale to bring out the characters properly.) The outer teeth are pale and uncoloured, very delicate in texture, highly irregular and prettily fringed with papillæ at the margins; the papillæ of the dorsal surface towards the base of the teeth arranged in lines which are usually horizontal, but show a peculiar variety in direction. The processes of the inner peristome, which is free or lightly adherent to the outer, are longer—at times considerably longer—than the outer teeth, and while filiform are not delicate nor fragile, but rather robust.

They show no median line or perforation, and as a matter of fact each one represents only one lateral half of the complete process, the other half remaining undeveloped, or having been absorbed; occasionally fragments of the missing half remain attached here and here to the side of a process, and show that if complete it would be of an extremely narrow linear-lanceolate outline, pierced by narrow slits. The striolation of the outer teeth varies considerably; in some capsules the lines are practically always horizontal, in others they take various directions, as referred to in the quotation below from Mons. Cardot's letter.

The somewhat doubtful position of the fertile flower, together with the peculiar peristome, suggest a relationship with *Mielichhoferia*, under which at one time Mons. Cardot was inclined to place the plant. The development of the outer peristome seems to necessitate its reference to *Areodictyon*, but it raises the question of the relation of the Section *Areodictyon* to the remainder of the genus *Bryum* and the allied genera of *Mielichhoferia* and *Brachymenium*. Dr. Hagen has already expressed the opinion that there are good reasons for elevating *Areodictyon* to generic rank (*cf.* Rev. Bry. 1907, p. 85). I quote the following from a very interesting letter of Mons. Cardot on this question :— " J'ai pensé un moment à placer cette Mousse dans le genre Mielichhoferia, en la rapprochant des Mielichhoferiopsis, mais je crois qu'il serait en somme préférable de la réunir aux Bryum de la section Areodictyon. Elle se rapproche des espèces de ce groupe par l'ornementation des plaques dorsales des dents de l'exostome, mais en diffère par les bords irréguliers de ces mêmes dents, par les segments de l'endostome plus étroits, non perforés, appendiculés au sommet, et par la nervure longuement excurrente. Je vous propose donc de la placer en Bryum (Areodictyon), mais je me demande, avec MM. Hagen et Nicholson (Rev. bryol. 1907, pp. 84–85), s'il ne conviendrait pas de considérer ce groupe comme un genre particulier, qui, à mon avis, se rapprocherait plus, par la structure du péristome, des Mielichhoferia que des Bryum ou des Brachymenium. La distinction entre les Mielichhofériées et les Bryées, basée sur la seule position des fleurs, me paraît bien artificielle, car on se trouve souvent en présence de cas douteux, sur des espèces appartiennant aussi bien à l'une qu'à l'autre de ces deux tribus. A mon avis, il serait bien préférable d'établir la séparation des deux tribus en prenant comme caractère distinctif la structure du péristome, et en attribuant aux Mielichhofériées les genres à endostome pourvus d'un emembrane basilaire courte et de segments très étroits (y compris les Stableria, les Orthodontium et les Areodictyon), et en ne laissant dans les Bryées que les genres à membrane basilaire élevée et à segments plus larges. Je serai heureux de connaître votre avis sur cette question. J'ajoute incidemment que la Mousse de Grèce qui a été publiée récemment sous le nom de *Mielichhoferia Coppeyi* Card. n'est autre que le Bryum (Areodictyon) splachnoides (Harv.) C. M. de l'Himalaya, que M. Nicholson a découvert aussi en Crète. En décrivant le péristome de cette espèce, M. Coppey compare très justement le dessin formé par les stries des plaques dorsales du péristome à celui que l'on observe à la face interne du pouce humain, et cette comparaison peut s'appliquer également à notre espèce."

I am strongly inclined to agree with the view here presented, but I have hesitated to make so great a change as it would involve within the narrow limits of this article, and content myself with suggesting it as probably a desirable rearrangement of these groups.

Bryum (AREODICTYON) **ghatense** Broth. & Dixon, sp. nov. (Tab. 513, fig. 3.) Humile, tenue, habitu *variabile*, nunc laxe nunc dense cæspitosum, interdum compactum brevicaule interdum laxe elongate tenuicaule, rufescens vel pallide rubellum. Caulis brevis, innovationibus sæpe elongatis, ad 1 cm. altis. Folia caulina superiora dense comata, ovata acuta vel ovato-lanceolata acuminata, innovationum maxime variabilia, ovata, lanceolata, denique anguste lanceolata tenui-acuminata; *tenerrima*, *perpellucida*, sæpe versus basin ruberrima, margine plano, elimbato, *integerrimo*; costa valida, per totam longitudinem subæqua, ruber, *percurrens vel sæpius in cuspidem brevem integram excurrens.* Areolatio *tenuissima*; cellulæ magnitudine multo variabiles, cum elongatione folii pariter elongatæ, illæ foliorum breviorum breviter hexagono-rhomboideæ, foliorum longiorum anguste rhomboideo-lineares, ad marginem parum angustiores; alares rectangulares. Seta tenuis, flexuosa, rubra, 2½–4 cm. alta. Theca *erecta vel subinclinata*, cum collo subæquilongo in setam sensim attenuata aut pyriformis aut clavata, *microstoma*, castaneo-rufa, operculo breviter mamillato. Exothecii cellulæ valde irregulares, parietibus firmis, curvatis. Annulus latus. Peristomium *parvum*, luteum, *maxime variabile*, dentes externi *angusti*, inter se remoti, ad basin haud conjuncti, intus lamellis circa 15 trabeculati, dorso superne læves inferne dense papillosi, papillis *nunc irregularibus nunc in seriebus transversalibus obliquisve dispositis.* Endostomium nunc rudimentarium, nunc e corona basilari tantum instructum; bene vero evolutum *processus tenues e membrana basilari hyalina dimidiam fere partem dentium æquante parvos lineares angustissime rimosos fugaces* dentibus adhærentes exhibens; ciliis nullis. Sporæ 20–25 μ, sublæves. ? ? Autoicum. Flores terminales (masculi ?) immaturi vel abortivi in ramulis propriis solum inventi.

Hab. On stones of a wall, Mahableshwar, Jan. 1909 (no. 63); on a stone pillar in a sunny place, Mahableshwar, Jan. 1909 (no. 61); on stonework of a small bridge, Lonavla, Sept. 1908 (no. 5; a dense compact form, with short stems, oval, shortly pointed leaves, a more flexuose seta and a more turgid capsule); earth-bank, Fort Purandhar, Poona District, May, 1910 (nos. 87, 88, 117); face of a quarry, Purandhar, Oct. 1910 (no. 125): all c. fr.; leg Sedgwick.

Var. SATARENSE Broth. & Dixon, var. nov. (Tab. 513, fig. 4.) *Elatum*, ad 2 cm. altum. Folia omnia *angustiora*, *longiora*, *anguste lanceolata vel lineari-lanceolata*, *angustissime tenui-acumi-*

nata, una cum costa excurrente longe subulata; areolatio *angustior*, *elongata*, juxta marginem sæpe in pluribus seriebus angustissime linearis.

Hab. On a stone pillar, Mahableshwar (with the type, no. 61), Jan. 1909 (no. 62), c. fr.; on earth-banks, Fort Purandhar, May, 1910 (no. 94), c. fr.; leg. Sedgwick. Frequently found with the type.

Strikingly different from the type in leaf-form and areolation, and it is indeed only the extreme variability of the typical form in these characters, together with the lack of any distinctive characters in the sporogonium, that has induced us to consider this plant as a variety only. It is quite possible, however, to find on the typical plant leaves with an approach to the outline and with almost the identical areolation of the variety. The fruiting characters present no differences. Derivation, from Satara, the district in which Mahableshwar is situated.

Bryum ghatense is a very distinct species, at once separated from the allied species of *Areodictyon* by the slender habit and narrow, delicate leaves, with excurrent nerve; the leaves for the most part at least tend to a narrow acuminate outline quite foreign to others of the section. *B. sahyadrense*, while resembling it in the leaf-form and structure, is a more robust plant, with larger leaves and a quite different peristome.

While, however, it is easy to point out the difference from the allied species, *B. ghatense* presents many perplexities, and considerable doubt as to its true position. Mons. Cardot indeed considers it to be a *Brachymenium*. The fact is that in its peristome (as well as in its vegetative characters) it exhibits a very wide range of variation, so much so that it is scarcely too much to say that, judged by the peristome alone, it would be often necessary to refer two plants from the same tuft, the one to *Bryum*, and the other to *Brachymenium*, while a third plant might quite justly be placed in *Haplodontium*! In fact, I have several times in the course of examination been driven to wonder if there were not two or three species inextricably mixed up, identical in all other characters, but differing only in peristome! It is not only the endostome that varies in development, but the dorsal surface of the outer teeth presents notable differences in sculpturing. Usually they are papillose, with the papillæ irregularly scattered (and it is this character principally which leads Mons. Cardot to place it in *Brachymenium*); at other times, however, they are almost smooth, while in other cases, and usually where the endostome is most highly developed, they present a striolated appearance, more or less distinct, and curiously resembling, in the varying direction of the striæ, those of *B. sahyadrense*, already described (though in other points entirely distinct). I am therefore inclined to consider this as indicative of the true position of the plant under *Areodictyon*. It is evidently a very plastic type, and one is inclined to hazard the suggestion as to whether we may not see in it a sort of starting point for the two groups of *Brachymenium* and *Bryum* § *Areodictyon*. Apart altogether from the peristome, there is a very striking resemblance in many features between this (with *B. sahyadrense*) and certain South Indian species of *Brachymenium*. The vegetative characters are so closely alike that it would appear often quite impossible from sterile plants to tell to which genus a plant belonged. The capsules in *Areodictyon* also frequently show a marked departure from the typical *Bryum* capsule, being inclined or suberect, nearly or quite symmetrical, and frequently also microstomous—a very usual character of *Brachymenium*—and it is indeed absolutely indeterminable from the general character of the sporogonium whether a plant belongs to *Brachymenium* or *Areodictyon*. When to this is added that the sole peristome characters by which the § *Areodictyon* can ultimately be separated from *Brachymenium* are striolate outer teeth, low basilar membrane and long narrow processes of the endostome, it will be obvious that a plant of the nature of *B. ghatense*, showing at once striate and estriate teeth, a varying basal membrane, which may at times be almost obsolete, and processes which more frequently than not are altogether undeveloped, offers a fruitful field to systematists, especially to the school addicted to what may be described as micro-taxonomy.

In tab. 513 (fig. 3*d*) I have figured the most highly developed (but less frequent) form of peristome.

It is perhaps worth while to mention that there does not appear to be any correlation between these peristome distinctions and the vegetative characters of var. *satarense*.

BRYUM CORONATUM Schwaegr. Mauarghat, Malabar District, 500 ft. alt., Oct. 1910 (no. 1), c. fr.; and Attapadi Hills, alt. 2300 ft., Oct. 1910 (no. 9), c. fr.; leg. C. E. C. Fischer.

B. ARGENTEUM L. Muttikulam bungalow floor, 3100 ft. alt., Attapadi Hills, Sept. 1910; leg. C. E. C. Fischer (no. 3), c. fr. A slender form, entirely different from the following.

Var. AUSTRALE Rehm. MS. in sched.

Syn. *Bryum oranicum* C. M. in Hedwigia, 1899, p. 68.

Differs from the type in the very robust stems, turgidly julaceous with the densely imbricate, suborbicular, cochleariform leaves, the upper third or half hyaline, without chlorophyll.

Hab. Castle Rock, Western Ghats, Oct. 1892; leg. G. A. Gammie, comm. Sedgwick (no. 100), st. Attapadi Hills, 5000 ft. alt., Oct. 1910; leg. C. E. C. Fischer (no. 10), c. fr.

Of all the forms of *B. argenteum* I have seen, several of which have been elevated to specific position, this is by far the most marked, and I think well deserving of varietal rank. The seta is rather long in the Attapadi plant, but otherwise the fruit does not seem to offer any differences from that of *B. argenteum*.

In searching through the material of *B. argenteum* at the British Museum, I have found nothing at all comparable to the plants in question except (*a*) Rehmann, *M. austro-africani*, no. 260. This C. Müller made the type of his *Bryum oranicum*, but I am fully in agreement with Brotherus (Engler & Prantl, *Pflanzenfam.*, *Musci*, p. 586) in retaining for it varietal rank only, in which case it seems desirable to retain the name given to it by Rehmann; (*b*) two specimens from Southern India, *viz.* one from Ceylon, "*Bry. argenteum* L., Centr. Prov., Ceylon, C. M. 111" (i. e. *Ceylon Mosses*, No. 111, issued by Thwaites)—the middle specimen only—the other a specimen from the Nilghiris, leg. Schmidt in Hampe's herbarium; part of this is separated as having "theca subrotunda," evidently a "sport" or pathological condition only. Numerous specimens from the same localities are quite typical *B. argenteum.* The var. *australe* appears to be a well-marked variety with a wide but at present clearly defined area, *viz.* the South of India and the South and East Central Africa. It appears to occur on Mount Ruwenzori, for, as Mons. Cardot points out to me, the plant recorded by Dr. Negri, on p. 17 of his *Memoir on the Mosses of Ruwenzori of the Duke of the Abruzzi's Expedition*, as *B. ellipsifolium* C. M., probably belongs here; the description, "Li dimensioni sono assai maggiori di quelle del *B. argenteum*, e le foglie caratteristicamente orbiculari," does not apply to C. Müller's species, but agrees well with the var. *australe.*

The Indian plants are slightly more robust than Rehmann's, but in all other points they are identical. C. Müller makes a purple nerve a strong character of his *B. oranicum* ("nervo angusto intense purpureo"), but the British Museum specimen of Rehm., no. 260, shows no trace of such a structure; the nerve at the most is reddish at the base of some of the leaves.

B. PSEUDO-ALPINUM R. & C. var. LATIFOLIUM Card. & Dixon, var. nov. Folia pro more latiora, 1·5–2 mm. longa, ·6–·7 mm. lata; rete laxius, e cellulis rhomboideis, 50–60 μ latis, 10–13 μ latis, instructum.

Hab. Purandhar Fort, Poona District, Oct. 1910; leg. Sedgwick (no. 110), st.

A rather strongly marked variety, bearing somewhat the same relationship to the type that *B. Mildeanum* has to *B. alpinum.* The leaf-apex is sharply denticulate, though the character is often masked by the strongly recurved margin.

Mons. Cardot informs me that *B. plumosiforme* Ren. & Card. must be referred to *B. pseudo-alpinum.*

B. WIGHTII Mitt. (*B. strigosum* Wils.). In lax carpet on rocks, Mahableshwar, Jan. 1909; leg. Sedgwick (no. 45), st.

B. strigosum, it should be noted, is a *nomen nudum*, being unaccompanied by any description.

RHODOBRYUM ROSEUM Limpr. Ghoom, Eastern Himalayas, 1910; leg. Miss Craig (no. 1), st.

MNIUM ROSTRATUM Schrad. Naga Hills, Assam, comm. W. R. Sherrin (no. 7), st. Specimens sent to the British Museum from the above locality exhibit the "accessory leaves" described by me in Rev. Bry. 1909, p. 141, very well.

ORTHOMNION CRISPUM Wils. On twigs of trees in a damp place, Mahableshwar, Jan. 1909; leg. Sedgwick (no. 50), st. *Cf.* Rev. Bry., *loc. cit.*

Explanation of Tab. 513.

Fig. 1. *Hyophilopsis entosthodontacea* Card. & Dixon. *a*, plant, natural size. *b*, *b'*, leaves, × 20. *c*, leaf apex, × 50. *d*, upper, *e*, basal cells, × 200. *f*, peristome viewed from within, × 200. *g*, stem section, × 200.

Fig. 2. *Orthotrichum Griffithii* Mitt. *a*, leaf, × 20. *b*, *b'*, leaf apices, × 20. *c*, upper cells, × 200. *d*, base of capsule, × 20. *e*, peristome, × 100. *f*, stoma, front view, *f'*, do., in profile, × 100.

Fig. 3. *Bryum ghatense* Broth. & Dixon. *a*, plant, × 2. *b*, *b'*, leaves, × 20. *c*, upper cells, × 200. *d*, peristome teeth, × 100 (dorsal view on left, ventral on right).

Fig. 4. Do., var. *satarense* Broth. & Dixon. *a*, plant, × 2. *b*, *b'*, leaves, × 20. *c*, upper cells, × 200.

Fig. 5. *Bryum sahyadrense* Card. & Dixon. *a*, plant. × 2. *b*, leaf, × 20. *c*, upper cells, × 200. *d*, peristome, × 75 (dorsal vew to left, ventral to right).

Fig. 6. *Brachymenium Fischeri* Card. & Dixon. *a*, plant, × 2. *b*, leaf, × 20. *c*, upper cells, × 200. *d*, peristome, dorsal view, × 100.

ALABASTRA DIVERSA.—Part XX.

By Spencer le M. Moore, B.Sc., F.L.S.

1. New or Rare Tropical African Plants.*

Rubiaceæ.

Randia vestita, sp. nov. Frutex (vel arbuscula) spinis sat longis rectis instructis, ramis validis cortice cinereo rimoso obductis efoliosis ramulos plures breves vel brevissimos foliosos sæpeque floriferos infra spinos emittentibus, foliis parvulis oblongo-obovatis rarius obovatis obtusissimis basi in petiolum brevem gradatim attenuatis firme membranaceis utrinque griseo-velutinis subtus pallidioribus, stipulis ovatis sursum attenuatis apice acutis velutinis, floribus pro rata submediocribus sæpissime solitariis subterminalibus breviter pedunculatis, ovario calycem excedente turbinato ut pedunculus et calyx campanulatus ore dentatus breviterve lobatus fulvo-velutino, corollæ tubo late cylindrico extus inferne glabro superne albo-sericeo intus infra medium annuloso-villoso lobis suborbicularibus tubo duplo longioribus, antheris breviter exsertis sessilibus anguste lineari-lanceolatis superne angustatis, stylo incrassato sub apice contracto corollæ tubo æquilongo, stigmate alte bilobo.

Hab. Salisbury; *Rand*, 1395.

Rami 5–7 mm. diam. Spinæ vulgo 5–10 mm. long.; ramuli sæpissime 5–15 mm. long., foliorum stipularumque reliquiis dense obtecti. Folia 1·5–2 cm. long., 7–12 (raro 15) mm. lat.; costæ secundariæ utrinque 4, nunc patulæ nunc ascendentes, rectæ levissimeve arcuatæ. Stipulæ summum 5 mm. long., subscariosæ. Pedunculi circa 3 mm. long. Flores albi. Ovarium 6 mm. long. Calyx (anne siccatione?) raro irregulariter ruptus, 4 mm. long., lobi dum adsint summum 1·5 mm. long. Corollæ tubus 5·5 mm. long., 5 mm. lat.; lobi 8·5 mm. long., supra medium 8 mm. lat. Antheræ 5 mm. long., inferne 1 mm. superne ·5 mm. lat. Stylus

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* The types of the new species here described are in the National Herbarium.

5·5 mm. long.; stigmatis lobi late oblongi, obtusissimi, pubescentes, marginibus recurvis, 3·5 mm. long., fere 2 mm. lat.

This differs from *R. nilotica* Stapf in the velvety leaves and flowers, the toothed or at most shortly lobed calyx, larger corolla-lobes, long and narrow anthers, and the longer turbinate ovary, which last character most probably points to difference in the shape of the berries. The spinose habit distinguishes it from the recently described *R. lasiophylla* K. Krause and *R. torulosa* K. Krause, both of which have larger differently clothed leaves, calyx longer than ovary, and shorter anthers. Moreover, the calyx of *R. lasiophylla* is lobed to the middle, and its ovary is hemispherical, while the other has, *inter alia*, corollas with a tube three or four times as long, and lobes half as long again.

Near this and virtually indistinguishable, without careful examination, is

Randia Taylori, sp. nov. Vestitu, ramis ramulisque, spinis, foliis, inflorescentia præcedentis, stipulis abbreviatis ovatis obtusis vel acutiusculis circa 2 mm. long., ovario ovoideo ægre 4 mm. long., calyce tubuloso ovarium excedente in toto 6 mm. long. lobis sæpissime ambitu subsemicircularibus vulgo obtusissimis basi haud contractis 2 mm. long., corollæ 5-lobæ lobis 5 × 4·5 mm., antheris ovato-oblongis apice acutiusculis fere 3·5 mm. long. 1·5 mm. lat.

Hab. German East Africa, between Zanzibar and Uyui; *Rev. W. E. Taylor.*

This differs from *R. nilotica* in the ovary and calyx and the smaller corollas.

Oxyanthus Gossweileri, sp. nov. Suffrutex humilis crebro ramosus ramis validis cortice crasso badio obductis foliorum delapsorum cicatricibus signatis, foliis parvulis suborbicularibus coriaceis utrinque pube copiosa grisea onustis petiolis elongatis dense piloso-pubescentibus suffultis, stipulis ——, inflorescentiis subsessilibus bracteatis perpaucifloris, ovario calyce breviore cylindrico dense pubescente, calycis dense pubescentis lobis lineari-lanceolatis acuminatis tubum paullo excedentibus, corollæ tubo limbum multoties excedente piloso-pubescente lobis oblongis acutis extus dense fulvo-pubescentibus, filamentis quam antheræ oblongæ obtusæ apice brevissime apiculatæ paullulum longioribus, ovario 2-loculari, stigmate clavato lobis brevibus deltoideis obtusis.

Hab. Angola, bank of River Kiuvivi near Kassuango; *Gossweiler*, 3275.

Folia modo 1·5–2·5 cm. long. et lat.; ordinis secundæ costæ utrinque circa 6, arrecto-ascendentibus, costulas quam se ipsæ minus perspicuas frequenter gignentibus; petioli circa 1·5 cm. long. Inflorescentiæ axis dense pubescens, circa 5 mm. long.; hujus bracteæ ovato-lanceolatæ, 3–4 mm. long. Flores dilutissime brunnei, suaveolentes. Ovarium 3 mm., calycis pars indivisa 2·5 mm. et lobi 3–3·5 mm. long. Corollæ tubus vix 6 cm. long., circa 1·5 mm. lat., faucibus ipsis extus densius pubescentibus 5 mm. lat.; lobi 1 cm. long. Filamenta 5 mm., antheræ 4 mm. long. Stigmatis lobi 1 × 1 mm.

A very remarkable plant on account of its lowly habit and small leaves.

Canthium Randii, sp. nov. Arbor altitudine mediocri, ramulis ultimis foliosis cinereo- vel fusco-corticatis glabris novellis scabriuscule pubescentibus, foliis majusculis brevipetiolatis ovatis vel ovato-suborbicularibus apicem versus attenuatis obtusis basi late rotundatis nonnunquam leviter cordatis papyraceis supra scabriusculis subtus ad nervos scabriuscule pubescentibus in sicco utrobique viridibus, stipulis triangularibus superne in acumen sat longum productis mox dehiscentibus dorso scabriusculis aliquanto resinosis, floribus parvis 5-meris in cymis axillaribus pedunculatis laxis quam folia brevioribus scabriuscule pubescentibus digestis cymulis scorpioideis plurifloris, pedicellis ovario subæquilongis, ovario turbinato scabriuscule pubescente, calyce valde abbreviato ore truncato, corollæ tubo late cylindrico lobis oblongo-ovatis acutiusculis æquilongo faucibus villosis, filamentis brevibus corollæ ori affixis antheris leviter exsertis ovatis subito breviter acutatis, stylo crassiusculo sub stigmate attenuato glabro stigmate breviter exserto oblate sphæroideo utrinque truncato longitrorsum sulcato.

Hab. Rhodesia, among granite kopjes near Salisbury; *Rand*, 1393.

Folia 7·5–11 cm. long., 5–9·5 cm. lat.; costæ secundariæ utrinque 5–6, pag. sup. planæ, inf. prominulæ etsi tenues, ascendentes vel ascendenti-patulæ, paullulum arcuatæ; petioli 5–10 mm. long., scabriuscule pubescentes. Stipulæ fuscæ, 7–8 mm. long. Cymæ bene evolutæ 3·5 × 6 mm. Pedunculus ± 1 cm. long.; pedicelli circa 1 mm. Flores albi. Ovarium 1·2 mm., calyx ·25 mm. long. Corolla tota 5 mm. long.; tubus 2·5 × 2·5 mm. Filamenta ·3 mm., antheræ paullulum ultra 1 mm. long. Stylus 3 mm. long., stigma 1 × 1·25 mm.

The inflorescence is much that of *C. discolor* Hiern, but the leaves and flowers have many points of difference.

Fadogia Kaessneri, sp. nov. Caulibus pluribus ascendentibus sesqui-bispithameis subdistanter foliosis tetragonis glabris, foliis plerumque ternatis brevissime petiolatis ovatis vel ovato-oblongis obtusis vel obtusissimis raro retusis basi rotundatis coriaceis utrinque glabris, stipulis a basi lata subulatis intus pubescentibus, floribus pro rata parvis in fasciculis axillaribus pedunculatis paucifloris digestis, pedicellis ovarium plane excedentibus ut pedunculus foliis brevior glabris, ovario subhemisphærico 3-loculo glabro, calycis limbo ovario breviore brevissime 5-dentato, corollæ extus glabræ tubo sursum levissime amplificato intus villoso lobis 5 oblongo-lanceolatis acuminatis tubo circa æquilongis intus minute sericeo-tomentosis, antheris ori insertis, stylo exserto dimidio inf. incrassato superne attenuato glabro, stigmate pileato.

Hab. N.W. Rhodesia, Malanguala River, under trees; *Kässner*, 2064.

Folia 2·5-3·5 cm. long., 12–15 mm. lat., in sicco utrobique brunnea; ord. sec. costæ utrinque 4, haud sine difficultate cernendæ, anfractuosæ; reticulum satis laxum; petiolus summum

1·5 mm. long. Stipulæ circa 4 mm. long. Fasciculi plerique 3–4-flori, in toto 2·5 cm. long.; pedunculus sæpius 1–1·5 cm. long.; pedicelli ± 5 mm. Ovarium 2 mm. long., calyx 1·5 mm. Corollæ tubus 4·5 mm. long., basi 3 mm., ore 4 mm. diam.; lobi 5 mm. long. Antheræ oblongæ, acutæ, 2·5 mm. long. Stylus ægre 8 mm. long.; stigma 1·25 × 1·25 mm.

This has the appearance of *F. obovata* N. E. Br., but is quite different in the flower. The affinity is with *F. glaberrima* Schweinf.

Fadogia salictaria, sp. nov. Satis elata, erecta, sursum ramosa, ramis gracilibus tetragonis glabris, foliis ternatis raro oppositis lineari-lanceolatis obtusis basi in petiolum brevissimum nec semper aspectabilem gradatim extenuatis membranaceis utrinque glabris, stipulis subulatis puberulis, floribus pedicellatis pro rata parvis in axillis fasciculatis fasciculis sessilibus breviterve pedunculatis sæpius 2–3-floris, ovario hemisphærico glabro, calyce ovario breviore denticulato-undulato, corollæ fere usque medium divisæ extus glabræ tubo cylindrico-infundibulari intus villoso lobis anguste ovato-oblongis acutis intus minute sericeis, antheris ori insertis oblongo-ovatis obtusis, stylo exserto superne attenuato glabro, stigmate pileato.

Hab. Congo Free State, under trees at Kipaila; *Kässner*, 2536.

Folia solemniter 4–5 cm. long., juxta medium 5–8 mm. lat.; costæ secundariæ utrinque 6–8, subtus prominulæ; reticulum obscurum, maxime laxum; petioli summum 2 mm. long. Stipulæ circa 1·5 mm. long. Pedunculi 0–6 mm. long., pedicelli 1–3 mm. Ovarium 1 mm., calycis limbus ·5 mm. long. Corollæ tubus 3·5 mm. long., ima basi 1·5 mm. ore 3 mm. lat.; lobi 4 mm. long. Antheræ 2 mm. long. Stylus 6 mm. long.; stigma 1·25 × 1·25 mm.

Differs from *F. stenophylla* Welw., *inter alia* in habit, usually ternate leaves, and shape of corolla-tube.

Kässner's no. 2350, from Kitimbo, Congo Free State, seems from the description to be *F. arenicola* K. Schum. & K. Krause (Engler, Jahrb. xxxix. p. 544), and the Museum specimens have been provisionally so named.

CAMPANULACEÆ.

Wahlenbergia saginoides, sp. nov. Annua, subspithamea, caulibus strictis tenuibus scabriusculis inferne foliis imbricatis onustis superne foliis sparsis minoribus, foliis parvis sessilibus anguste linearibus acutis margine cartilagineis raridenticulatisque vel integris, cymis paniculatis laxis crebro ramosis bracteatis plurifloris, floribus parvulis pedicellatis, ovario 3-loculo hemisphærico quam calycis lobi subulato-lineares breviore, corollæ vix usque medium divisæ tubo calycem breviter superante lato superne leviter dilatato lobis ovatis obtusis, stigmate breviter exserto 3-ramoso.

Hab. Rhodesia, Victoria; *C. F. H. Monro*, 649.

Planta circa 12 cm. lat. Folia inferiora ± 5 mm. long., circa

1 mm. lat., superiora ± 2·5 mm. long. Paniculæ 6–8 cm. long., usque ad 10 cm. vel etiam magis diam.; harum bracteæ anguste lineares, ± 2 mm. long. Pedicelli ± 5 mm. long., ascendenti-patentes. Flores verisimiliter albi. Ovarium 1 mm. long. Calycis lobi 1·6–2 mm. long. Corollæ tubus 2·5 mm. long., ima basi 1·5 mm. ore 2·5 mm. diam.; lobi 2 mm. long. Stylus 3·5 mm. long.; stigmatis rami ·75 mm. long.

Nearest *W. leucantha* Engl. & Pilg., which is a stronger growing plant 30 cm. high, with a longer and relatively narrower corolla, lobed to only one-third of its length. Its habit is that of *Sagina nodosa* L.

SAPOTACEÆ.

Mimusops (QUATERNARIA § INTEGRÆ) **Monroi**, sp. nov. Ramulis teretibus cito glabris cortice cinereo longitrorsum rimoso mox circumdatis frequenter foliosis (novellis arcte minute ferrugineis), foliis lanceolatis vel lanceolato-oblongis basi apiceque obtusis margine cartilagineis coriaceis supra glabris subtus primo minute ferrugineis dein glabris costis secundariis utrinque circa 10 supra vix subtus haud sine difficultate cernendis petiolis 4–5-plo brevioribus fultis, floribus pro rata submediocribus in axillis 2–3-nis, pedicellis petiolos sæpissime excedentibus minute ferrugineis, calycis segmentis 8 lanceolatis obtuse acutis extus ferrugineis, corollæ lobis 8 lineari-lanceolatis acuminatis, appendicibus corollæ lobis æquilongis iisque similibus, antheris lanceolatis apiculatis quam filamenta paullo longioribus, staminodiis lineari-lanceolatis caudato-acuminatis quam appendices paullo brevioribus dorso villosis, ovario subgloboso sericeo, stylo crassiusculo ima basi sericeo ceterum glabro.

Hab. Rhodesia, Victoria; *Monro*, 761.

Foliorum limbus solemniter 5–9 cm. long., 1·5–2·8 cm. lat., pag. sup. olivaceo-badius, pallidissime nitens, pag. inf. viridis; costa media supra plana, subtus maxime eminens; reticulum ægre aspectabile; petioli 1–2 cm. long., canaliculati, ferruginei cito glabri. Pedicelli plerique 2 cm. long. Calycis segmenta 7 mm. long. Corollæ tubus 1 mm., lobi 6 mm. long. Filamenta 2 mm., antheræ 3 mm. long. Staminodia 5 mm. long. Ovarium 2 mm., stylus 7 mm. long.

To be inserted next *M. marginata* N. E. Br., which has terminal inflorescences, longer pedicels, and staminodes only half as long as the corolla-lobes.

Mimusops (QUATERNARIA § LACINIATÆ) **decorifolia**, sp. nov. Ramulis subteretibus dense etsi minute ferrugineis deinde glabris (novellis ferrugineis), foliis quam petioli 3½-plo longioribus oblongo-ovatis vel obovato-oblongis obtusissimis apice ipso sæpius leviter retusis basi obtusis margine cartilagineis tenuiter coriaceis supra glabris subtus in nervis sparsissime ferrugineis alibi minute puberulis costis secundariis utrinque circa 15 (additis aliis ord. tertiæ his ægre æquiprominentibus) patentibus sub margine eximie arcuatis, floribus pro rata parvis, pedicellis in axillis sæpius 1–2 quam petioli brevioribus ut calycis segmenta minute ferrugineis, calycis segmenta 8 oblongo-ovatis acutis corollæ circa æquilongis, corollæ segmentis 8 oblongo-ovatis acutis minute denticulatis, appendicibus 8 petalis oppositis iisque æquilongis ad medium usque vel magis alte 2–4 lobis segmentis oblongis vel oblongo-linearibus acutis, staminibus corollæ segmentis paullo brevioribus antheris ovato-lanceolatis acuminatis quam filamenta plane longioribus, staminodiis staminibus circa æquilongis anguste lineari-lanceolatis acuminatis dorso villosis, ovario subgloboso sericeo, stylo crassiusculo glabro.

Hab. Rhodesia, Victoria; *Monro*, 811.

Foliorum limbus 6·5–7 cm. long., 3·3–3·8 cm. lat., in sicco pag. sup. olivaceus subtus dilute griseo-viridis; costa media supra plana subtus eminens; costulæ ut reticulum laxiusculum utrobique æque aspectabiles; petioli minute sed dense ferruginei, canaliculati, 1·8–2 cm. long. Pedicelli circa 1·5 cm. long. Flores pansi circiter 1 cm. diam. Calycis segmenta 6 mm. long. Corollæ tubus 1·5 mm., lobi ægre 5 mm. long. Filamenta 1·75 mm. long., antheræ 2·5 mm., staminodia 4 mm. Ovarium 2 mm. long., stylus 4·5 mm.

Near *M. Pohlii* Engl., which has differently shaped leaves, longer pedicels, lanceolate corolla-lobes with irregularly laciniate and denticulate appendices.

ASCLEPIADEÆ.

Asclepias Gossweileri, sp. nov. Planta tuberosa caulibus simplicibus ascendentibus subspithameis plurifoliosis strigoso-pilosis, foliis omnibus oppositis lanceolato-oblongis obtusis basi in petiolum brevem angustatis pergamaceis utrobique præsertim vero pag. inf. pilis strigosis sparsissime indutis, umbellis pro caule 3 lateralibus pedunculatis corymbosis 3–5 floris, pedunculis inferioribus folia excedentibus omnibus pilosis, bracteis filiformibus pilosis quam pedicelli brevioribus, calycis segmentis lineari-lanceolatis acutis patentibus dorso marginibusque pilis strigillosis sparsim onustis, corollæ alte partitæ segmentis ovato-oblongis obtusissimis quam calycis segmenta paullo longioribus, coronæ phyllis e basi columnæ stamineæ ortis et eandem paullulum excedentibus erectis basi solummodo cucullatis superne oblongo-lanceolatis obtusis leviterque concavis utrinque basi dente arrecto obtuso antheris applicato et una cum parte cucullata harum dimidium inferius occultante instrüctis cucullo intus apicem versus pulvino pubescente induto, antherarum alis prominentibus appendicibus ovatis supra stigma inflexis.

Hab. Angola, Camoma, Ambaka; *Gossweiler*, 4557.

Folia in sicco glauca, 3–4 cm. long., 7–10 mm. lat.; petioli circa 3 mm. long. Pedunculi inferiores fere 5 cm. long., reliqui 1–3 cm.; bracteæ adusque 5 mm., pedicelli 10 mm. long. Flores monente cl. detectori fusco-purpurei. Calycis segmenta 8 mm. long. Corollæ tubus 2 mm. long., segmenta 10 × 4·5–5 mm. Coronæ phylla 5·5 mm. long.; dentes basales 1·5 mm. long. Columna staminea 4·5 mm. long., antherarum alæ ægre 2 mm.

This is very near *A. pulchella* N. E. Br., its chief peculiarities being the shorter pedicels to the dusky purple (not rose-coloured) flowers, the less hairy calyx, the longer and relatively narrower segments of the corolla, and the longer coronal lobes with their prominent basal teeth, which reach much higher up the staminal column.

I have to thank Mr. N. E. Brown for kindly examining a flower, and confirming my suspicion of its being distinct from *A. pulchella*. The tuber is noticed in Mr. Gossweiler's note, but the only specimen to hand is without this.

Kanahia Monroi, sp. nov. Fruticosa, glabra, ramis strictis subteretibus crebro foliosis, foliis sessilibus anguste lineari-lanceolatis apice acutis pungentibusque crassiusculis, floribus pro rata magnis, racemis brevibus longipedunculatis paucifloris pluribracteatis, bracteis pedicellis multo brevioribus lanceolatis acutis diutule persistentibus, pedicellis calyces 2–3-plo excedentibus, calycis segmentis lanceolatis acutis quam corollæ segmenta fere duplo brevioribus, corollæ satis alte partitæ segmentis oblongo-ovatis obtusis intus minute puberulis margine ciliatis patentibus, coronæ phyllis ex columna staminea paullo supra basin ortis superne complicatis a latere visis subquadratis apice in dentes duo fere horizontales columnam stamineam incumbentibus desinentibus, columna staminea coronæ phyllis æquialta, folliculis abbreviatis ovoideis apice breviter necnon obtusissime umbonatis in sicco longitrorsum rugulatis glabris.

Hab. Rhodesia, Victoria; *C. H. F. Monro*, 1100.

Caulis circa 4 mm. diam., ad nodos levissime tumidos pilis brevibus rigidis albis instructus. Folia pleraque 10 cm. long., juxta medium 5–7 mm. lat., in sicco læte viridia. Pedunculi 4–5 cm. long., erecti. Pedicelli 1·5–2 cm., bracteæ ± 5 mm. long. Flores profecto pansi 2·5 cm. diam. Calycis segmenta 7 mm. long. Corolla tubus 3 mm., segmenta 12 mm. long. Columnæ stamineæ basis nuda 2 mm. long. Corollæ phylla 4 mm. long., horum dentes obtusæ, 1·5 mm. long. Antherarum alæ basi haud divaricatæ, 2·5 mm. long.; appendices triangulares, obtusæ, stigmati convexiusculo impendentis; glandula ovata, ·4 mm. long.; caudiculæ ·3 mm. long.; pollinia oblongo-pyriformia, 1·5 mm. long. Folliculi (umbone 4 mm. long. inclusa) 3 cm. long., vix 2 cm. lat. Semina 3–4 mm. long., coma circa 8 mm.

A very distinct species, differing from *K. laniflora* Br. and *K. glaberrima* N. E. Br. *inter alia* in the short follicles, and from *K. consimilis* N. E. Br. in the flowers larger in all their parts, the coronal lobes reaching the same height as the staminal column, the anther-wings parallel throughout, and not divaricate at the base, &c.

SCROPHULARIACEÆ.

Manulea rhodesiana, sp. nov. Herba erecta, satis elata, ramosa, paucifoliosa, minute papilloso-puberula, foliis caulinis (radicalibus haud visis) parvis linearibus basi levissime dilatatis margine sparsim denticulatis subcoriaceis, floribus permultis secus

ramulos abbreviatos dense vel longiores laxiuscule digestis paniculam thyrsoideam elongatam referentibus, bracteis linearibus calycem circa æquantibus, calycis alte partiti papillosi segmentis, oblongo-spathulatis crassiusculis, corollæ tubo calycem multo excedente gracili faucibus ipsis dilatato crassiusculo extus papilloso lobis inter se fere æqualibus (2 posticis paullo angustioribus) oblongo-obovatis obtusissimis intus glabris, stylo incluso, capsula obovoidea apice emarginata calyci æquilonga glabra.

Hab. Rhodesia, Victoria; *Monro*, 924.

Planta saltem trispithamea. Rami tetragoni vel subtetragoni, longitrorsum multistriati, ut folia inflorescentiaque papillis brevissimis albidis muniti. Folia circa 1–2 cm. long., et 2 mm. lat. Bracteæ 1–2 mm. long. Flores verisimiliter aurantiaci vel aurantiaco-punicei. Calyx totus 2 mm. long.; lobi 1·8 mm. Corollæ tubus 8 mm. long., ·5 mm. lat., faucibus 1 mm. lat.; lobi patentes, vix 2 mm. long. Antheræ superiores brevissime exsertæ, fertiles etsi immunitæ, ·25 mm. long., harum filamenta ·75 mm. long.; antheræ inferiores oblongæ, obtusæ, 1 mm. long., harum filamenta ·2 mm. long. Stylus circa 7 mm., capsula 2 mm. long.

Near the South African *M. parviflora* Benth., but different in the narrow leaves, the smaller calyx with spathulate segments, and the longer corollas. This is the second known tropical species of this largish South African genus.

Stemodiopsis linearis, sp. nov. Suffrutex parvus, glaber, caule verisimiliter repente subtereti nudo, ramulis gracillimis fere a basi foliosis, foliis sessilibus anguste linearibus obtuse acutis margine revolutis, floribus in axillis solitariis, pedicellis foliis brevioribus supra medium bracteolis duabus parvulis filiformibus onustis ascendentibus sub fructu decurvis, calycis segmentis lineari-lanceolatis acuminatis quam corollæ tubus brevioribus, corollæ tubo superne levissime amplificato labio postico ovato bifido antico postico paullulum breviore intus minute pubescente palato valde intruso, staminum anticorum filamentis juxta medium tortis, staminodio filiformi a staminibus remoto, capsula decurva ovoidea obtusa breviterve rostrata glabra.

Hab. Congo Free State, Mt. Penga, on rocks; *Kässner*, 2964.

Tota planta circiter spithamea. Folia ± 2 cm. long. (sæpissime 1·5–2·5 cm.), circa ·5 mm. lat. vel etiam minus. Pedicelli plerique 7–12 mm. long.; horum bracteolæ 1·5 mm. Calyx 3·25 mm. long. Corollæ tubus 5 mm. long., inferne 1·5 mm. ore 2·5 mm. lat.; labium posticum intus sparsim piloso-puberulum, margine ciliolatum ægre 3 mm. long.; labium anticum 2·5 mm. long., hujus lobi abbreviati, rotundati, vix 1 mm. long. Staminodium corollæ tubi basin versus insertum 2 mm. long.; staminum anticorum filamenta 3 mm., posticorum 2 mm. long.; antherarum loculi divergentes, anguste ovato-oblongi, ·8 mm. long. Ovarium 2 mm. long., stylus 3 mm. Capsula 7 mm. long.

The linear leaves serve to distinguish this from its few congeners.

Ilysanthes micrantha, sp. nov. Annua, parva, glabra, caule gracili simplici erecto sursum sparsissime ramoso distanter folioso, foliis sessilibus anguste linearibus obtusis integris, floribus paucis axillaribus vel pseudoterminalibus, pedicellis sat longis filiformibus erectis sub fructu patenti-nutantibus, calycis abbreviati campanulati adusque medium divisi lobis lanceolatis acuminatis, corollæ parvæ tubo calycem paullulum excedente lato superne brevissime amplificato labio postico anticum breviter excedente late oblongo apice rotundato ipso emarginato labii antici lobis inter se subæqualibus rotundatis, staminum posticorum loculo altero minimo casso loculis ambobus basi barbatis, staminodiis magnis superne clavatis necnon longe ciliatis, capsula oblonga acuminata calycem multo excedente.

Hab. Rhodesia, Victoria; *C. F. H. Monro*, 1031.

Planta summum 6 cm. alt. Folia ± 5 mm. long., circa ·5 mm. lat. Pedicelli solemniter 1–1·5 cm. long., sub flore tenuissimi. Calyx totus 2 mm. long.; tubus 1 mm. long., ore totidem lat.; lobi 1 mm. long. Corollæ tubus 2·5 mm. long., faucibus ægre 2 mm. diam.; labium posticum 4 × 2·5 mm.; labii antici lobus intermedius 3 × 4 mm. Stamina corollæ faucibus infra os fere 1 mm. inserta; filamenta complanata, vix 2·5 mm. long.; antheræ fertiles ovatæ, ·75 mm. long. Staminodia leviter cohærentia, incurva, fere 3 mm. long., horum clava 1 mm. long. Stylus 3 mm. long.; stigma ·5 × 1 mm. Capsula 7–9 mm. long.

The plant is remarkable for the large club-shaped, coherent, ciliated staminodes and the rudimentary second cell of its stamens.

(To be continued.)

NOTES ON *EPILOBIUM* HYBRIDS.

By R. H. Compton.

The study of naturally occurring hybrids is at the present day beset with difficulties, the chief of which is the lack of experimental data. The process of identification of a supposed hybrid is in nearly all cases based on the assumption that the characters exhibited are intermediate between those shown by the parents. The species selected as the supposed parents are usually those which differ from the plant under consideration by about an equal amount on either side. As a rule, no experimental evidence is forthcoming, and the chief criterion of hybrid-nature is intermediateness between a pair of species selected to account for the facts. This assumption is carried still further in the case of "tertiary hybrids," which are supposed, on grounds of intermediateness, to have arisen from the union of a hybrid with a pure species. In fact, it appears that the words "hybrid" and "intermediate" are sometimes used indiscriminately—a deplorable, though almost logical, result of the method of identification adopted in the past. When we read in a Flora, "A large number of hybrids occur in this genus, therefore many plants will yield mixed characters," though we may accept the statement without demur, it must not blind us to the fact that the historical process would be more fitly summed up in the inverse form of words, thus:—"A large number of plants yielding mixed characters have been found in this genus, therefore extensive hybridization has been assumed."

Now it is quite clear that this method, though in the hands of skilled observers it may often yield accurate results, is essentially faulty. Recent experimental work has demonstrated that a cross-bred is by no means necessarily intermediate between its parents; it may even be indistinguishable from one of them, and show no trace of the other. The phenomena of dominance and the Mendelian segregation of unit-characters are of the greatest importance to students of naturally occurring hybrids; but the general acceptance of these facts by systematists has been tardy, and in only a few cases has a sense of their importance been expressed.* Whatever may be the exact applicability of the newly discovered phenomena to the mutual relationships of the highly complex congeries of characters which separate naturally occurring species, the experimental method is now seen to be indispensable for the solution of problems of hybridity. The mode of work should be changed, from the almost mathematical search for extremes to suit a given mean, to the emasculation and artificial-pollination processes of the experimental garden.

To take one or two examples. Writing of *Epilobium roseum*, Sir James Smith remarked in 1800: "Is it possible to have arisen from seeds of *E. tetragonum* impregnated by the pollen of *E. montanum?*" But it was not till 1842 that Bell Salter made the suggested cross,† and found that the result was *not* identical with *E. roseum*. (See below.)

Again, I grew plants in my garden which were absolutely indistinguishable from typical *Epilobium hirsutum*. These had, however, been grown from seed produced by fertilising the occasionally occurring white (or rather, very pale pink-tinged) variety with pollen taken from the typical red-flowered plant. They were thus true cross-breds; and when artificially self-fertilized they set seed which produced, out of fifteen plants, eleven having the full red flower of the type *hirsutum*, and four having the pale pink flower of the variety, the result approximating to the well-known Mendelian ratio 3 : 1.

There are thus two tests for hybridity: (1) The sowing of artificially self-pollinated seeds and the observation of the off-spring; (2) The reconstruction of the hybrid by the union of selected parents. The first test is often inapplicable, maybe because of sterility, or the complexity of the characters involved; but the second is usually practicable, and should be considered essential in any study of the phenomena of hybridity.*

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* See, for instance, Moss, "The Pimpernels," *Journ. Bot.* 1911, p. 44.

† *Phytologist*, 1852, p. 737.

The sure method of identifying a naturally occurring plant supposed to be a hybrid is the following. The supposed pure parental species are cultivated in a garden and crossed artificially. The resulting offspring (if any) are grown in the garden side by side with the wild plant, and the comparison is made. The usual experimental precautions must be taken; and the plant should be observed over a series of years, in order to allow for the differences in perennials between the first year's growth and that of succeeding years.

The experimental method is cumbrous and lengthy, but conclusive. Its adoption would obviate such a controversy as that between Rev. E. S. Marshall and Mr. C. B. Clarke over the existence and determination of wild hybrids (*Journal of Botany*, xxix. 1891, pp. 225, 296; xxx. 1892, pp. 78, 106). Mr. Clarke stated that "the makers of hybrids often go no further than the diagnostic characters of systematists; their hybrids are not hybrids between any two plants that ever lived, either species, crosses, or individuals, but hybrids between two of the hybrid-monger's own diagnoses." Mr. Marshall termed this "caricature, pure and simple"; but, like all caricature, it contains an element of truth. The fact on which it is founded is that systematists have almost exclusively explained *ignotium per ignotiis*, and substituted questionable hypotheses for experimental proofs. Though Mr. Marshall succeeded in proving his case so far as it went, the lack of experimental evidence is manifest, and it was this lack that made the controversy possible.

The genus *Epilobium* is remarkable for the frequency with which interspecific hybrids are produced; and as there also exist a great number of forms and varieties, the genus is a difficult one to study. The size and detail of Haussknecht's magnificent monograph is witness to the complexity that exists in the genus. Naturally occurring "hybrids" have been repeatedly observed, and many such have been described with great care by Haussknecht and others; but it seems important for the better knowledge of the genus that artificial hybrids should be made experimentally between species and varieties of constant type (as tested by raising from self-fertilized seed).† With this object I have produced certain hybrid willow-herbs by the ordinary experimental method of emasculating the flower before the anthers dehisce, pollinating from the other species, and covering with a bag until the fruit begins to set and the corolla falls off. Two such hybrids have this year been distributed through the British Botanical Exchange Club, and it is hoped that more will be available in the coming years. The following are notes upon the two hybrids distributed so far.

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* In the case of a supposed wild hybrid the species in whose company it occurs may give valuable hints as to its possible parentage; and collateral evidence is often furnished by a study of its geographical distribution with respect to that of the supposed parent species. But such *ex post facto* evidence cannot have the cogency of direct experimental results.

† The following are the *Epilobium* hybrids which are recorded in the literature (so far as I know it) as having been made by design:—

E. Lamyi × *montanum*: Haussknecht made the cross both ways, and found the hybrids indistinguishable (*Monograph*, p. 27).

E. montanum × *parviflorum*: both reciprocal crosses were made by Haussknecht (*loc. cit.*), and found almost identical.

E. montanum, female × *roseum*, male: Focke (*Pflanzenmischlinge*, p. 528).

E. montanum, female × *obscurum*, male: Focke (*loc. cit.*).

E. montanum × "*tetragonum*": Bell Salter (*loc. cit.*) made the reciprocal crosses, and found the products identical. (See below.)

E. adnatum Griseb., forma *stenophylla* Hausskn., male × *E. hirsutum* Linn., female. Both parents were identified with certainty by Rev. E. S. Marshall: they were both grown in Cambridge gardens, as were also the hybrids (open situation in light soil). Seven hybrids were grown in 1909, and all were absolutely uniform in appearance. A plant found once only by Haussknecht at Greussen, in Thuringia (1857), was identified by him as *E. adnatum* × *hirsutum*, and was carefully described (*Monograph*, p. 103). From this description my artificial hybrid differs in several points, while agreeing in the main. The discrepancies do not appear to be fully explained by the use of the "forma *stenophylla*,"* and future experiment can alone determine the reason for them. The following are the chief points in which my hybrid differs from Haussknecht's description:—

(1) The stem is quite terete towards the top.

(2) The leaves, though they half clasp the stem below, do not do so at the top.

(3) The upper leaves are but little more hairy than the lower (which are almost glabrous), and cannot be described as "allmählich beiderseits angedrückt grau behaart."

(4) There are no long erect hairs, such as are present in *hirsutum*; the hairs are longer than in *adnatum*, and are obliquely directed upwards, *i. e.* their position is intermediate between the closely appressed down of *adnatum* and the erect hairs of *hirsutum*. There are no swollen tips to the hairs, such as are found in the shorter hairs of *hirsutum*.

(5) The pedicel of the capsule is usually about 1·5 cm. long, and the capsule itself never grows to more than 3–4 cm. (Haussknecht's figures are: pedicel 1·0 cm., occasionally reaching 1·5 cm.; capsule 5–6 cm. long.)

The hybrid lacks the long runners of *hirsutum*; autumnal rosettes are formed close to the plant, their leaves being long and strap-shaped, much as in *adnatum* f. *stenophylla*, but larger.

The flowers are like those of *adnatum* in size, colour, and general appearance; the stigma is clavate, slightly notched, and larger than in *adnatum*, being about 3 mm. long; it frequently protrudes at the tip of the flower before anthesis. The anthers seem to be usually contabescent. Flowering goes on until very late in the autumn.

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* I am inclined to agree with Mr. Marshall that the forma *stenophylla* deserves varietal rank; several plants preserved their proper characters when raised from seed and grown in my garden at Tewkesbury side by side with typical *adnatum*. Mr. Marshall noticed the narrowness of the leaves in this hybrid as being "greater than one would *primâ facie* expect from a cross with the type" *adnatum*.

In no case was seed set in 1909–1910, though superficially the ovules appeared well-formed; and attempts to fertilize the flowers with pollen from *adnatum* f. *stenophylla* and from *hirsutum* were also fruitless.

While most of the characters of the hybrid are intermediate between those of the parents, it may be remarked that the presence of long runners, of erect, long, shaggy hairs, of terminal glands on the shorter hairs, and of large flowers (all characters possessed by *hirsutum*), are all apparently recessive. The study of their exact hereditary behaviour is, however, checked by sterility.

E. adnatum Griseb., female × *montanum* Linn., male. The parent stocks originated from plants self-sown in my garden at Tewkesbury, and came true from seed. Both were quite typical, agreeing well with Haussknecht's descriptions. I raised twenty-five plants of the hybrid, and all were absolutely uniform in appearance; they correspond closely on the whole with Haussknecht's descriptions of wild specimens. The following points of interest may be added to his remarks (see *Monograph*, p. 104):—

(1) The upper part of the stem is practically terete, only the lower part showing decurrent lines.

(2) A transverse commissure joins the bases of the opposite leaves, this being a character derived from *montanum*.

(3) The stigma is very shortly four-lobed, this condition differing from that found in *adnatum* f. *stenophylla* × *hirsutum* (above). Thus the results of crossing § Synstigma and § Schizostigma are not always identical as regards the characters of the stigma of the hybrid.

(4) The capsules appear well-formed, but the seeds seem to be always imperfect and are without embryos. This was also observed by Haussknecht, who states that the seeds are totally sterile.

The last point is of interest with regard to Bell Salter's artificial hybrid between *montanum* and "*tetragonum*" (*loc. cit.*). He says: "I saved seeds from the original hybrids, and sowed them. The second race was indistinguishable from the first. The seeds of these I again saved and sowed, and still no difference could be detected; and so on to four turns, when, being satisfied of the reproductive powers of the hybrids and the permanence of the form, I discontinued the experiment." It is difficult to know what value to set upon these remarkable results, in the absence of information as to what exactly was the plant used by Bell Salter under the name *tetragonum*. If it were *adnatum* Griseb., his results conflict with Haussknecht's and mine as regards the complete sterility of the hybrid. If it were *obscurum* Schreb., they conflict with Haussknecht's description of the supposed wild *montanum* × *obscurum*, which states that "the seeds are sometimes completely shrivelled, at other times only partly developed and sterile."* It is just possible, though extremely improbable, that Bell Salter's plant was *E. Lamyi* Schultz, in which case there is a very slight chance of escape from the dilemma, for Haussknecht remarks that *E. Lamyi* × *montanum* (as found wild and as produced artificially) has "seeds for the most part undeveloped." If this means that *some* good seeds are produced, this gives a loophole of escape for Bell Salter's results; but the odds against their correctness are enormous. They certainly cannot be accepted at present without hesitation, and further experimental work is necessary to reconcile the various conflicting statements which have been made on this subject.

In conclusion, I desire to express my thanks to Dr. C. E. Moss and to Rev. E. S. Marshall for valuable assistance.

NOTES ON *LEPIDIUM*.

By C. E. Salmon, F.L.S.

In this Journal for 1910 (pp. 17, 162), mention is made of the variety *longistylum* of *Lepidium campestre*, and some doubt is expressed as to what this really is. By the kindness of Miss M. C. Knowles, of the Dublin Museum, the Director allowed me to see Mr. A. G. More's Irish specimens upon which the variety was based, and I was able to obtain the opinion of Dr. A. Thellung, author of the Monograph of *Lepidium*, published in 1906.

The sheet contains two specimens, both with rather young fruit, and both consisting of a single stem branched solely near the summit; the label reads—"*Lepidium campestre* var. *longistyla*. Cultivated field, Loughgall, Co. Armagh. Coll. A. G. More. May, 1854."

Contrary to his first opinion that Mr. More's plant might come under *L. heterophyllum*, Dr. Thellung named the examples *L. campestre*, with the following note:—"*forma* stylo quam in forma vulgari vix longiore, varietatem non constituens. In *L. campestri* 'styli pars libera cum maximum ½ mm. longa' (Thell. Lepid. Mon. 1906, 76), in *L. heterophyllo* 'plerumque 1 mm. longa.'" I gathered a plant exactly matching Mr. More's specimen as regards length of style near Godstone Station, Surrey, in 1908, and it is probably not rare. Mr. More admitted years ago that he did not consider the "form of any importance as a variety," but it remains in our handbooks and lists to the present day.

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* Focke's artificial *montanum* × *obscurum* had "some good seeds and also barren crumpled seeds in considerable numbers" (*loc. cit.*). It seems probable that his "good seeds" correspond to the "partly developed" seeds of Haussknecht's wild hybrid; such seeds strongly contrast with the aborted ovules, and only dissection or sowing reveals their sterility.

Dr. Thellung (*l. c.* p. 93) includes under *L. campestre* proper the var. *foliosum* Rouy & Fouc. mentioned in Journ. Bot. 1910, p. 17.

In looking over other examples of *Lepidium*, Dr. Thellung noted the following from my herbarium :—*L. heterophyllum* (DC.) Benth. var. *leiocarpum* Thell. Near Montrose, Forfar, *W. Gardiner*, Aug. 1843.

L. densiflorum Schrad. Among garden rubbish, Rugby, June, 1898, *S. T. Dunn.* Waste ground, West Dock Reservation, Hull, v.-c. 61, Sept. 1902, *C. Waterfall.*

L. neglectum Thell. Gravel pits near Burford Bridge, Surrey, Aug. 1905, *C. E. S.*

L. densiflorum is close to *L. virginicum* L., as indeed both examples from the above localities had been named by the gatherers (see Watson Bot. Ex. Club Reports, 1898–99, p. 5, and 1902–3, p. 8). It may be separated from that plant by its compact spike of flowers and smaller seed vessels.

L. neglectum Thell. is near *L. ruderale* (as I had called my Burford Bridge plant), but is easily distinguished by its winged seeds and more orbicular silicle. I have since noted the plant from the following localities:—Waste ground, Putney, Surrey, July, 1881, *G. C. Druce & W. W. Newbould* (Hb. Brit. Mus.). Side of Port Meadow, Oxon., June, 1882, *G. C. Druce* (Hb. Brit. Mus.). Earlston, Wigton, v.-c. 74, 7, 89, coll. Mc Andrew (Hb. A. Bennett). In every case the plant was named *L. ruderale.*

Both *L. densiflorum* and *L. neglectum* are N. American plants, adventive in Europe, and Dr. Thellung wrote on both my specimens:—"In Anglia nondum indicatum"; in his Monograph, however, under *L. densiflorum*, one finds the record, which I print as given,—"England: East Greenwich, R. J. Mickfud [?] R. J., 1878, C. W. Congdon—Herb. Reut. & Barb."

FLOWERS AND INSECTS.

By the Rev. E. Adrian Woodruffe-Peacock, F.L.S.

The following notes are the outcome of a correspondence with Mr. Charles Nicholson, of Chingford, who is much interested in the cross-fertilization in the long and short styled forms of Primrose and Polyanthus. Observers usually do not begin to collect the facts they require early enough in the year. The hive-bee (*Apis mellifica*) and flies (Diptera) were out this year in January; beetles soon followed; Lepidoptera and other orders have not been taken yet (March 18, 1911) as visitors to flowers.

As a result of forty years' interest in this subject, I find insects move pollen from flower to flower under the following circumstances: in seeking (1) honey, or (2) pollen; in (3) sunning (or taking daylight rest ?); seeking (4) rest at night or during dull or cold days (sleep ?); while taking temporary (5) shelter during passing rain-storms; seeking (6) victims; while moving from flower to flower in (7) copulation; also by (8) violence. In this list, by 3 and 4 I mean something quite different. Sunning or daylight rest is quite different from the heaviness of the evening or dark hours of night. I suggest sleep because insects are not on the alert as when sunning or resting in broad daylight; they are much more easily taken in the glass tubes in which I capture specimens for identification. Butterfly or sweeping nets are much too inclusive for this special work. On 8 a few words must be said. Pollination in many so-called anemophilous species is caused by disturbance from insects flying through grass and other vegetation, and shaking out the pollen by the violence of their movements. They carry, I find, a proportion of the disturbed pollen on their bodies, to be scattered and left when they come in contact with other plants—often, in the case of grasses, of the same species. This form of pollination is quite independent of the help they give to wind drift.

The hive-bee has been working in this parish (Cadney-cum-Howsham) part of ten days since January last. *Galanthus* was the first species I saw visited; then in order came *Eranthis, Crocus, Helleborus fœtidus, Primula vulgaris, Cheiranthus, Daphne mezereum* (but not *D. Laureola*, though it is in full flower), and *Viola odorata*. In every case the bees were collecting pollen. During four days bees have visited Primroses and Polyanthuses in three gardens here. Our local Polyanthuses are only the caulescent variety of the Primrose, without the least admixture, so far as I can discover. Now, though I am miles from the nearest clump of wild primroses, there have been quantities of garden ones flowering here since early February.

During the opening days of March bees were steadily gathering pollen on all the flowers during the midday hours. All were visited, but the short-styled were the favourites. Every flower—and there are hundreds—must have been visited in the Manor House garden here. The bees seemed to prefer plants approximating in colour to the wild form, but in the end all were visited. I noticed also the same preference for the yellow-coloured forms in the school-house garden at Howsham, two miles away. All the Primroses left in my garden are off-coloured, there are few plants, and, so far as I and my little sons have been able to observe, they have not been visited. I have taken for my type collection of insect visitors specimens of hive-bees with Primrose pollen-masses on their thighs. I find that these masses often fall off their legs after the bees are cyanided, though the tubes preserve them.

Bees carry the pollen of the short-styled form on the hairs of the body, ligula, &c., and leave a certain proportion of it on the long-styled pistil in searching this form. The bee carefully inserts its ligula into the tube of each flower; it, however, only delays if there is pollen on the lower side of the pistil, corolla-mouth, or on the petal disc. It leaves the pollen of the short-styled form, as a rule, only on the first and second flowers visited. In a few minutes another worker comes along, and leaves short-styled pollen on the long-styled pistils, not hitherto cross-fertilized though perhaps visited, by beginning its work with another flower and visiting them in another order.

Until March 11th I could not fully make out how the pollen from long-styled was transferred regularly to short-styled flowers. After watching some hours about midday I discovered it was brought about in the following manner, thanks to the breeze blowing at the time: the lashing of the flowers on their stalks in the spring wind and the whipping caused by the visits of the bees shake the ripe pollen from the stamens on to the under side of the long-styled pistil and to the corolla-mouth. In rarer cases it appears even to reach the petal disc, for I have observed bees collecting it there. Two days later the rough westerly sleet-showers filled the petal discs of the long-styled upright flowers in my garden with water. In almost every case the pollen of the long-styled form was floating on the water. Yet I have every reason to believe that the plants in my garden have remained unvisited. It is quite unusual to find long-styled pollen on the discs of long-styled plants in the Manor House garden when the bees are working. From the shape of the stigma and its place in regard to the opening of the corolla in the long-styled form, and the closely felted hairs of these parts, only in rarely exceptional cases have a few globules of water entered into the flowers, but the pollen escapes all the same.

When a bee's ligula is inserted into a long-styled flower a certain proportion of pollen is withdrawn. It may come from the lower side of the stigma or the corolla-mouth side, or it may be gathered from the petal disc, if it has been thrown out by the whipping of the flowers. The bee's next visit may be to a short-styled form. Its first action is to force its ligula amongst the stamens, and by doing this a certain proportion of the long-styled pollen reaches the short-styled pistil buried in the corolla. The bee then withdraws its ligula, and begins to collect the pollen on its legs. No doubt the thrusting in of the ligula when it first arrives greatly aids in the dispersal of the pollen in the short-styled form. A certain proportion of the long-styled pollen even reaches the short-styled stigma, for so far as I can learn, unless bees are very plentiful, the crossing from the short to the long is much more regular and bountiful than from the long to the short-styled form. As each flower in the early days of the season is carefully and systematically worked at in most places by hive-bees, I have no doubt both forms are fully cross-fertilized. Later on, when hive-bees have a wider sweep of floral species, the Primrose is more or less neglected by them. This explains, no doubt, an observation I made as far back as 1877, that the seed from the early wild Primroses is more fertile than from the later flowers.

While the bees were working the Primroses this season, other hive-bees were visiting the other plants named above, with the exception of *Galanthus* and *Eranthis*, which were past flower. In no case did I see a bee go from one species to another. In summer wild bumble-bees do cross from species to species. Here is the first record I can put my hand on: "*Bombus lucorum*, 23. 8. 1910, crossed from *Centaurea nigra* to *Leontodon autumnalis*. It was seeking honey in both cases." Was it feeding itself rather than gathering food for others? In my experience hive-bees do not do so; neither early nor late in the season have I observed it in forty years. An old bee-keeper once told me that neither honey nor bee-bread would keep if they were to do so.

Taking the flowering season throughout, I estimate that twenty-four flies (Diptera) visit the flowers of our whole flora for each insect of all the other orders put together, the Thysanoptera excepted. When it is on the wing in the summer heat Thrips is on every flower, even those of the simplest grasses, in countless numbers. The number of flies that visited flowers was most astonishing to me when I first discovered the fact. In mid-summer, when bees and beetles are most active and common, the proportion, though high, is nothing like one to twenty-four, but later in the season the notes soon run the other way. By mid-October the bees have practically ceased to work, but the flies continue as long as the flowers last, nearly up to Christmas in open sunny seasons. For example, on the 16th of last October I noted in a two-mile walk, on two soils, thirty-seven species in flower in this parish. A bee was on one species, a fly or flies on twenty-six, and there were as many as three species of flies on one flower, on which there were five altogether. Looking at the question of insect visitors in the light of a life-interest in the subject, I am inclined to agree with Andrew Knight (1799), that "in no plant does self-fertilization occur for an unlimited number of years"; not even in cleistogamous species as we call them.

WILLIAM AMBROSE CLARKE.

(1841–1911.)

Another of the supporters of this Journal and of the friends of its Editor has been removed from among us in the person of William Ambrose Clarke, who died at Oxford on the 23rd of February. He was born at Hinckley, Leicestershire, on February 6th, 1841, his father, the Rev. T. A. Clarke, being then curate at Stapleton. He was articled to Mr. Peter Awdry at Chippenham and practised for about twenty years as a solicitor, chiefly at Chippenham, of which town he was Mayor in 1879. Here he became interested in botany, and was associated with the Rev. T. A. Preston, then at Marlborough, in investigating the county flora, his help being duly acknowledged in the *Flora of Wilts*, published by Preston in 1888. His first communication to these pages was in 1887—a brief note recording certain additions to the county flora as then known.

In January 1892 Clarke married Miss Emily S. Ward, daughter of the Vicar of Great Bedwyn, and in October of the same year he came to Oxford, where he remained until his death. A devout and convinced Anglican, he was for fifteen years sidesman at the church of SS. Philip and James, of which he was also for a short time churchwarden. We had for some time become somewhat intimate as correspondents, and on his occasional visits to town he used to call upon me at the Natural History Museum; it was on one of these visits that I suggested to him the compilation of a list of the records of the occurrence of the native plants of this country, which I had long thought would be of interest, and which his knowledge of botanical literature, then already considerable, rendered him qualified to undertake. This list was begun in the Journal for January 1892 and continued at somewhat irregular intervals until the end of 1906, when it was reissued as a volume entitled *First Records of British Flowering Plants*. Clarke was, however, never quite satisfied with the form in which the list appeared in the Journal, where exigencies of space demanded more strict limitations than he thought desirable; and in 1900 he published a second edition, "revised and corrected," which gave him more satisfaction and is indeed an important contribution to the history of British botany. In his introduction Clarke sets forth his views on nomenclature, which were sentimental rather than logical; he had strong objections to certain consequences of the adoption of the Vienna Code, and these were often the subject of amusing discussion between us.

Although possessed of a good knowledge of British plants, it was the bibliographical side of botany in which Clarke took most interest, and his proximity to the Bodleian and the Botanic Garden gave him every opportunity for following out his bent.

His bibliographical note on the dates of Curtis's *Flora Londinensis* (Journ. Bot. 1895, 112) is a good example of his careful work, and sums up all that is known on the subject. In 1901 he published in the Journal (pp. 128–140) an interesting account of the progress of British botany in the nineteenth century, which showed his familiarity with the literature of the period. One of his interesting discoveries was the account of *Eriocaulon septangulare* in an appendix to vol. ii. (p. 784 *bis*) of Withering's *Arrangement* (1776); this had been overlooked and the name cited in *Index Kewensis* (1796) and elsewhere as from the 3rd edition. The plant had been named *Nasmythia articulata* by Hudson in 1778, and Hudson's trivial, apparently the earliest, had been taken up by recent writers, who called the plant *E. articulatum*. The restoration of the name generally accepted gave Clarke much satisfaction. Clarke largely collaborated with the Rev. E. S. Marshall in the compilation of the tenth edition of the *London Catalogue*, and he transcribed for publication the reprint of Linnæus's *Flora Anglica* issued as a supplement to this Journal for 1909.

During the later years of his life the state of his health compelled frequent visits to health resorts, where the local botany always interested him. His herbarium, though not large, contained specimens of most of our British plants, the majority of which he had seen *in situ*. An addition to these was *Hypericum dubium*, which, although far from uncommon, Clarke had not collected; Mr. Druce took us to see it one Sunday afternoon last summer, during the little jaunt referred to by him in this Journal (p. 233).

It was only during the last few years that I became personally intimate with Clarke. "Week-ending" with friends at Iffley, I had to go into Oxford to church, and afterwards not infrequently, though not as often as I think both of us would have liked, went to him for luncheon. He was happy in the possession of a wife who took an intelligent interest in his pursuits; both had literary tastes (Clarke was a fine classical scholar), and an afternoon spent in their company was a pleasant experience to look back upon. Clarke was indeed one of the kindest of men, with a keen sense of justice; this latter prompted his last note in this Journal (1909, 447) and he was not a little distressed at the storm in a tea-cup which was raised by his well-intentioned intervention.

Clarke became a Fellow of the Linnean Society in 1890, but subsequently withdrew; he rejoined the Society in 1909. A good and interesting correspondent, he will be missed by many botanical friends as well as by the writer of this notice.

James Britten.

SHORT NOTES.

A Boy Botanist.—Under the heading of "Botany," the Seventy-seventh Annual Report of Bootham School (York) Natural History, Literary, and Polytechnic Society, says:—"A. W. Graveson is again *the* botanist of the year, and his collection has now reached the marvellous total of 1012 species [of British Flowering Plants presumably] as against 800 last year. This collection must surely be a record for any schoolboy, and we must again congratulate Graveson on his energetic and enthusiastic work." Thus Bootham School, whose Natural History Society is the oldest of any such school society in England, creates another record, and at the same time it is pleasant to realize that mere collecting is by no means the only thing encouraged at that school, which has produced, to mention a few of its botanists only, J. G. Baker, E. G. Baker, F. W. Oliver, A. H. Burtt, Miller Christy, H. Corder, H. Tuke Mennell, and the late James Backhouse and Silvanus Thompson. Some other branches of Natural Science and Literature are equally well represented by distinguished names among the alumni of this well-known Friends' School.—H. S. Thompson.

Pyrus cordata Desv. in Monmouthshire (v.-c. 35).—Just within the county, close to the Wye, on a high rough bank, in the parish of Dixton, I found two plants of this species in 1910. It grows within a few miles in Gloucestershire, at Symonds Yat, and in Herefordshire, on the Doward. When I pointed out the trees to Mr. Ley, he agreed to the identification.—H. J. Riddelsdell.

REVIEWS.

A Monograph of the British Lichens, being a Descriptive Catalogue of the Species in the Department of Botany, British Museum. Part II. By Annie Lorrain Smith, F.L.S. 8vo, cl., pp. 409; 59 plates. Price £1 1*s*.

Many years have elapsed since the publication (in 1894) of the first volume of a *Descriptive Catalogue of the British Lichens in the National Herbarium*, compiled by the late Rev. J. M. Crombie. At the death of the author 66 genera of British Lichens out of a total of 93, according to the arrangement given in the Conspectus Generum of vol. i., had thus been published, including descriptions of 580 species, with numerous subspecies, varieties, and forms. Lichenologists have been expecting eagerly, and now welcome joyfully, the appearance of vol. ii. of the Catalogue, in which Miss Lorrain Smith carries to completion the work projected by Crombie.

It would seem by reference to the Conspectus in vol. i. that the greater part of the work had already been accomplished in that volume, which leaves only 26 genera to be dealt with, according to the original arrangement. It happens, however, that these remaining genera include the largest, and some of the most perplexing, groups of lichens, and therefore it is perhaps fair to say that the bulk of the work has fallen to Miss Smith. The 26 genera of Crombie have increased by additions and subdivisions to 55, including the large number of 858 species, as against 580 of the previous volume. The additions are due partly to the inclusion among lichens of plants formerly regarded as algæ (*Cœnogonium*, *Racodium*), partly to the discovery in recent times of genera new to Britain (e. g. *Gongylia*). The subdivisions bring the book into line with Continental text-books, and cannot fail to be acceptable to students who have had to grapple hitherto with the unwieldy mass of incongruous species "lumped" together under such genera, for instance, as *Lecidea* and *Verrucaria* in the older manuals. It is, of course, quite possible to go to the other extreme by the process known as "splitting," but while this has been avoided, confusion is obviated by careful and systematic reference to modern synonyms. As stated in the introduction to this volume, "more importance is assigned in these days to the microscopic character of the apothecia than was allowed by Nylander and Crombie in their scheme of classification." Relying on such natural distinctions, Miss Smith adopts 11 of the genera into which *Lecidea* has been divided, with three subgenera of the restricted genus—*Psora*, *Biatora*, *Mycoblastus*. Of the old genus *Graphis*, as described in Leighton's *Lichen-Flora of Great Britain and Ireland*, only four species are retained under that generic name, the rest being assigned to *Phæographis* and *Graphina*. We venture to think that the author might have gone a step further, and adopted *Aulacographa* for *G. elegans* and the allied species with a furrowed proper margin to the fruit. Out of *Verrucaria* of the old lichenologists, 13 genera are taken, which yet leaves 48 species in the type-genus.

A systematic and modern revision of natural affinities is indicated by the removal in the scheme of this volume of the orders *Cladoniaceæ* and *Gyrophoraceæ* to the subtribe *Lecideei*, and of *Dirinaceæ* and *Roccellaceæ* to the *Graphidei*. *Strigula*, *Endococcus*, and *Myriangium*, regarded by Crombie and other lichenologists of his time as belonging to lichens (see vol. i.), are here relegated to fungi pure and simple. This fact is mentioned by Miss Smith (p. 263), though the names are not to be found in the index, whilst *Agyrium* and *Odontotrema*, presumably also fungi (vol. i. p. 15), are left without reference.

Since in these and other details the systematic arrangement preferred by Miss Smith differs rather widely from that propounded by Crombie in the introduction to vol. i., we are inclined to think that a new Conspectus Generum, following the lines adopted in this volume, might have been desirable. The meagre glossary of technical terms prefixed to vol. i. has expanded in this to one that is copious as well as clear, while the admirable index to the entire work will be especially hailed as a boon by those students whose good resolutions of indexing the previous volume for themselves have never been carried out. After the small figures of microscopic details in the first part of the work, the fifty-nine full-page illustrations of the second part come as a pleasing surprise. These plates, ranging from a view of the plant as it appears *in situ* to highly magnified points of structure, are attractive and, so far as we have had an opportunity of testing them, accurate.

In looking through this manual we are reminded of the general acceptance at the present time of the once much controverted doctrine of symbiosis in lichens. Ignored by Crombie in vol. i., and indignantly repudiated by Nylander and Leighton, it is assumed as an undoubted fact by the author of the present volume. Indeed, not the least interesting and valuable feature of the book is the mention under each genus of the particular algal form that constitutes the "symbiont," or messmate, in the composition of the lichen.

It is hardly necessary to say that this manual is indispensable to the student of British Lichens. While no futile attempts at "popularizing" them are made by the sacrifice of technical terminology, the somewhat pedantic and deterrent style of preceding Lichen-Floras has been happily avoided, and thus it may well be hoped that recruits will be enlisted for the practical study of these interesting plants. That increased activity of this kind has manifested itself of late is proved by the success of the recently established Exchange Club of British Lichens, which already can boast of members from all parts of the United Kingdom, and has resulted in the discovery of a considerable number of species new to the British Flora, or even to science, all of which are described in the addenda to this volume. The few misprints observed are mainly in local names, and are no doubt due to defective handwriting on labels; one contributor, at any rate, feels he must cry *meâ culpâ* in this respect! It need only be added that no more effective proof could be given of the richness of the National Herbarium than the fact that a catalogue of species therein contained, described by an expert, becomes an admirable and exhaustive Manual of British Lichens.

H. P. Reader.

Flora of Jamaica: containing Descriptions of the Flowering Plants known from the Island. By William Fawcett, B.Sc., F.L.S., and Alfred Barton Rendle, D.Sc., F.R.S. Vol. i. Orchidaceæ. Pp. xviii. 150, 32 plates. Price 10s. 6d. Dulau, Soho Square, W.

This well-printed and well-illustrated volume is the first instalment of an important undertaking for which the Trustees of the British Museum are responsible. That such a work was in preparation has been known to the readers of this Journal, in which the descriptions of the new species contained therein have from time to time been printed, but these in their necessary isolation from the text could give no notion of the extent of the complete enumeration. The combination of authors is a happy one, for Mr. Fawcett left the Museum to become Director of Public Gardens and Plantations in Jamaica and there had the opportunity for twenty-one years of studying its flora *in situ*, and was able to obtain the loan of all the material in the Jamaican Herbarium and of a fine series of drawings made at the Gardens, under his supervision, by Miss Helen A. Wood; while Dr. Rendle's long connection with the Department of Botany has familiarized him with the contents of the Herbarium and with the literature bearing on the subject.

The Flora is intended for use in the field as well as in the herbarium, and care has been taken to make it of service to the botanist or collector who may wish to employ it in the island. Thus the descriptive portion of the book before us is prefaced by a general account of the *Orchidaceæ*, followed by a very full key to the genera. The descriptions of the genera and species are also full and have evidently been drawn up with much care; there is an excellent bibliography and synonymy for each species, and the distribution is fully detailed, the number of localities and collectors cited—among the latter Mr. William Harris, Superintendent of the Gardens, is conspicuous, showing that the investigation of the island has been very thoroughly undertaken. The whereabouts of the type specimens is frequently indicated; in the case of Swartz's specimens in the National Herbarium these should sometimes perhaps be considered as authentic examples, named as they are by Swartz himself, than actual types: the authors, by the way, have been fortunate in obtaining the loan, from Berlin, of a valuable collection of Swartz's unpublished drawings.

The thirty-two excellent plates, largely taken from the drawings by Miss Wood already referred to, contain figures or details of a hundred and thirty species, and add greatly to the value of the work.

Minnesota Algæ. Vol. i. JOSEPHINE TILDEN. Report of the Survey. Botanical Series, viii. Minneapolis, Minnesota. April 1, 1910.

THE title of Miss Tilden's book is somewhat misleading. One wonders why a book should be labelled "Minnesota Algæ," when very few of the included species are found within hundreds of miles of Minnesota. There appears to be a newly-developed, but at the same time a widespread, ambition on the part of modern authors of works on the algæ of small areas to include those of the whole world. This was first conspicuously manifested in Chodat's *Algues Vertes de la Suisse*, which was chiefly remarkable for the description (often very poor and accompanied by atrociously bad references) of those algæ which do not occur in Switzerland, nor are ever likely to occur there. The first completed volume of Lemmermann's *Algenflora von Brandenburg* is of a similar nature, only, if we may so express it, much more so! Lemmermann, by a wild flight of imagination, would have one believe that these plants are so cosmopolitan that all the algæ of the world must sooner or later be found in Brandenburg! Works of this kind are decidedly misleading, and give a false impression concerning the distribution of algæ. Moreover, they scarcely serve a useful purpose when the geographical distribution is omitted.

Miss Tilden's work, as stated on the title-page (possibly as an explanation of what is meant by "Minnesota Algæ"!), is a synopsis of "the *Myxophyceæ* of North America and adjacent regions, including Central America, Greenland, Bermuda, the West Indies, and Hawaii." As a compilation of previous records for the areas in question the work is good, and will be decidedly useful. One would like, however, to see such compilations treated from a more critical standpoint, although such treatment obviously necessitates great personal experience and knowledge of the plants dealt with. The study of the subject would in this way be materially advanced and the work would be of immeasurably greater value. There appears to be an entire absence of critical observation from the whole of the volume under review, and this seriously detracts from its importance as an up-to-date record of the systematics of the *Myxophyceæ*. To give one instance: both *Phormidium uncinatum* and *P. autumnale* are fully described, with accompanying references and distribution, although Johs. Schmidt, and others, have clearly shown that it is not possible to discriminate between them.

The illustrations will no doubt be a useful feature of the book, but they are mostly copies of well-known figures by other authors. One would have imagined that a work of this nature would have given scope for many original drawings.

The use of the term "plant" instead of "cell" for the single cells of the *Coccogoneæ* is not a very happy expression. The author has also repeatedly used the name "De Toni" as a specific authority when it should have been "Forti."

The compilation has been well done, and there are singularly few errors, but one's first impression on opening the book is distinctly not a good one, as it suffers like so many American publications from a lack of discrimination in the type. Specific names, authors' names, and geographical areas are all in the same type, and it is positively difficult to discover where one species ends and another begins. This entails a great waste of time in making use of the book for specific determinations.

G. S. West.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on March 16th, Mrs. D. H. Scott gave a lantern exhibition of new species of the fossil genus *Traquairia*. She also exhibited the original diagram made by Dr. W. Carruthers, who first described the genus at a meeting of the British Association in 1872, in a paper entitled "*Traquairia*, a Radiolarian rhizopod from the Coal-Measures." Count Solms-Laubach, Professors Schenk, Strassburger, and Zeiller considered it comparable to the massulæ or sporocarps of *Azolla*. Professor Williamson (Phil. Trans. 1880) thought it the spore of a cryptogam. He found a group of three *Traquairiæ* in a sporangium of *Lepidostrobus*, and thought them three megaspores of a tetrad. The true megaspores are, however, now well known. Mrs. Scott defined *Traquairia* thus:—"*Traquairia* is a spherical organism, consisting of two parts each surrounded by a sharply defined membrane: an inner capsule, often containing spores, and an outer part, which is surrounded by a thick gelatinous envelope.

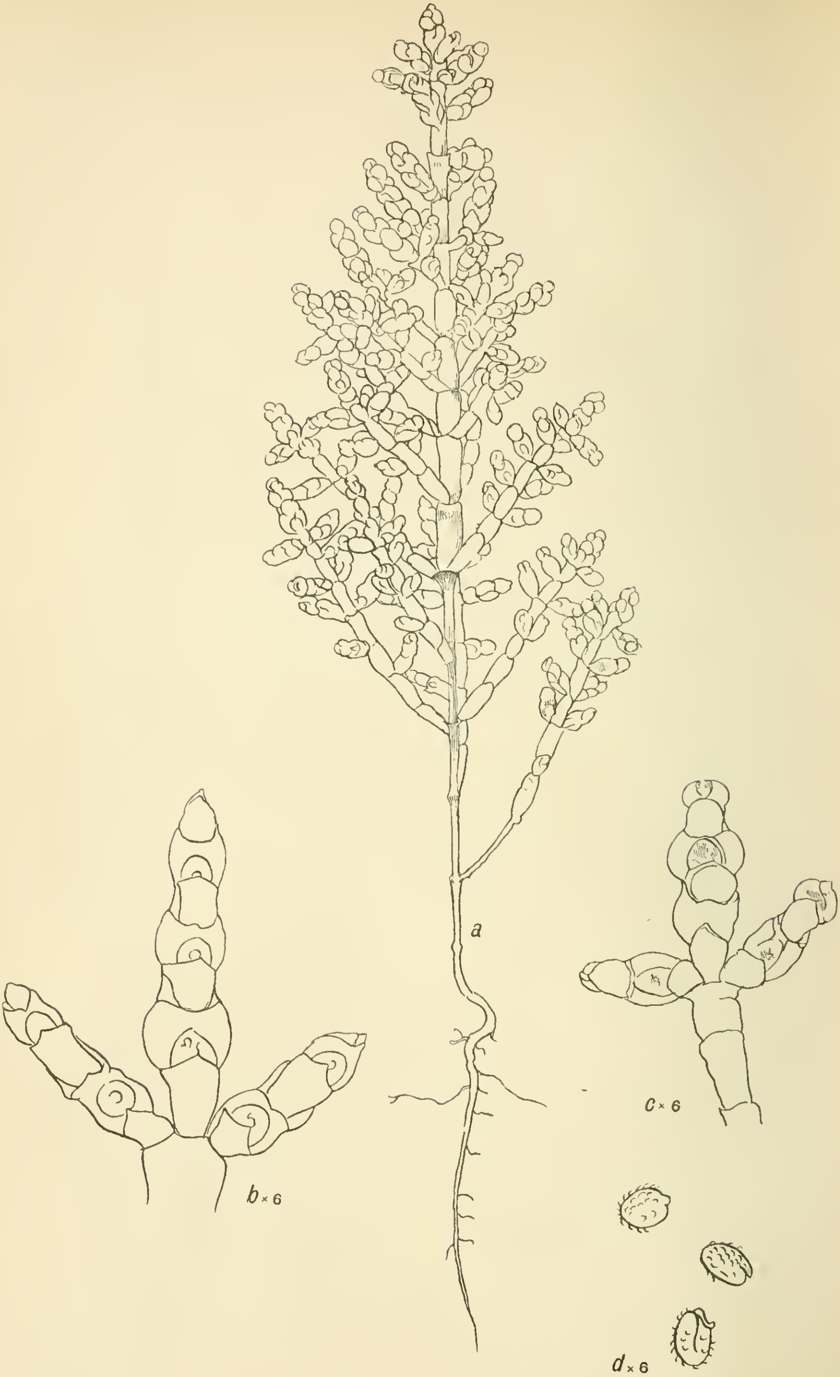
In this are embedded numerous hollow spines. The apparent bases of these spines are produced into hollow anastomosing tubes, which spread over the surface of the sphere, forming a complicated network. The spines are hollow, and are perforated in every direction by projecting tubular pores. Emanating from these pores are delicate threads which appear to lose themselves in the gelatinous envelope. Sometimes the threads form a regular network in it. The inner capsule, a definite brown membrane, can only be observed in the more perfectly preserved specimens. Spores are generally present, which appear to produce small spores. The *Traquairiæ* occur in groups in the decayed wood of *Lepidodendron* and other plants." She then exhibited *T. Caruthersii*, *T. Spenceri*, sp. nov., *T. burntislandica*, sp. nov., and *T. stellata*, sp. nov., and a species of an allied genus, *Sporocarpon elegans*. The most characteristic feature in the organisms described is the very complicated structure of the outer envelope with its elaborate system of anastomosing tubes connected with prominent spines, which are themselves very complex organs. Nothing parallel to this is known in the vegetable world. The presence of an "inner capsule" containing spores, in the interior of which small spores are produced, reminds one of Radiolarians. These features are also common to *Sporocarpon elegans*, which with its long spines is very much like a Radiolarian.

At the same meeting, Mr. R. S. Adamson gave a lantern demonstration of his communication entitled "An Ecological Study of a Cambridgeshire Woodland," of which the following is an abstract:—The woodland investigated (Gamlingay Wood) is in the extreme West of Cambridgeshire, situated on Boulder Clay. This Boulder Clay gives rise to two soils—one a heavy fine-grained calcareous clay, and the other a non-calcareous loam. These soils are markedly different, especially in water-contents; the calcareous clay has a large water-content all through the summer, while the loam never gets so wet in winter, and dries up very much in summer. Correlated with the differences in the soils, the two types of vegetation are quite different. Oak (*Quercus pedunculata*) is dominant all over. On the clay beneath the standard trees is a dense shrub-layer consisting mainly of Hazel and Ash, with numerous other species in less quantity. This layer is periodically coppiced and allowed to regenerate naturally; on the loam, shrubs, as a distinct layer, are absent. The ground floras of the two soils are also quite different. Each can be divided into several societies depending on the interaction of several factors, of which soil-moisture and light-intensity are the most prominent. The chief plants of the clay flora are *Spiræa Ulmaria*, *Deschampsia cæspitosa*, *Mercurialis perennis*, and *Primula elatior*; and of the loam, *Pteris aquilina* and *Holcus mollis*. That part of the wood on the clay is an (Ash)-Oak-Hazel Wood, and that on the loam a dry Oak Wood.

In his introductory study of *The Liverworts, British and Foreign* (Witherby & Co., 1911, pp. viii, 74, 49 figs., price 2*s*. 6*d*. net), Sir Edward Fry has produced a companion volume to his popular essay on the *British Mosses.* The plan of the book is briefly as follows. Two typical forms, one thallose (*Pellia epiphylla*), the other foliose (*Diplophyllum albicans*), are described clearly and in simple language. The principal groups of Hepaticæ are then treated in turn—*Ricciea*, *Monocleæ*, *Anthocereæ*, *Marchantieæ*, *Jungermannieæ.* And finally such general matters as leaves, gemmæ, modes of reproduction, alternation of generations, are discussed. The tables of unicellular and multicellular gemmæ, their various forms and their place of reproduction in various genera of *Jungermannia*, are helpful and instructive. Exception may be taken by systematists to the position given to *Monocleæ*, and especially to the inclusion of *Calobryum* in the group. There is a tendency nowadays to range *Monoclea* near to *Targionia* among the lower *Marchantieæ*; and *Calobryum* is akin to *Fossombronia.* Again, the *Anthocereæ* should hold a detached position right outside the Hepaticæ. However, these questions of classification do not affect the real value of the book for the elementary student, for whom the author has provided an attractively written essay, containing a well-digested and simplified account of the morphology, anatomy and life-history of a difficult but interesting group of lowly plants.—A. G.

We are somewhat surprised that Mr. Praeger's *Open-Air Studies in Botany* (Griffin), which we noticed at some length on its first appearance (Journ. Bot. 1897, 453), has only now reached a second edition. It is one of the best books introductory to a knowledge of wild flowers in their homes—indeed we might say *the* best, for we know of no other volume which tells so much about plants as they actually live, or which is so charmingly illustrated by pictures from "photographs from nature." We cannot do better than repeat what we said in the notice referred to: "In a word, *Open-Air Studies* is the very thing to put into the hands of those who want in small compass an intelligible and accurate introduction to field botany." This second edition, which is inscribed to the memory of the late S. A. Stewart, "a true field naturalist," has been revised throughout, though this has involved little alteration; the nomenclature has been brought into line with the British Museum *List of Seed-Plants.* The publishers still disfigure the title-page of review copies with an ugly violet stamp, to which is added an indication in ink that the book costs 6*s.* net.

John H. Hart, who was born in Suffolk in 1847 and died at Trinidad, Port of Spain, on the 20th of February, had been Superintendent of the Botanic Gardens there since 1887; he had previously been Director of the Jamaica Botanical Department. In 1908 he issued a list of the plants contained in the herbarium of the Botanical Department at Trinidad, which includes the collections by Lockhart, Purdie, Finlay and Prestoe, as well as more recent collections made by himself and others. An enumeration of the Ferns and Fern Allies of the British West Indies and Guiana, by G. S. Jenman, was edited by Hart and published in fragments with the *Bulletin* of the Botanical Department issued under his direction, and was subsequently issued as a volume.



E. W. Hunnybun del.
West, Newman imp.

SALICORNIA DISARTICULATA *Moss.*

SOME SPECIES OF *SALICORNIA*.

By C. E. Moss, D.Sc.

(Plate 514.)

The following is a preliminary account of an investigation, conducted by Dr. Ethel de Fraine, Mr. E. J. Salisbury, and myself, on some species of *Salicornia* which we have collected during the last three years. The investigation was commenced at Professor F. W. Oliver's ecological station on a sandy salt-marsh—the Bouche d'Erquy—on the north coast of Brittany. The dried collections at the Linnean Society's rooms, at the British Museum (Natural History), at Kew, and at Cambridge have been examined, and also dried specimens kindly lent by Mr. C. Bailey, Mr. G. C. Druce, Professor C. Flahault, of Montpellier, Rev. E. F. Linton, Rev. E. S. Marshall, Mr. C. E. Salmon, Rev. C. H. Waddell, and Dr. E. de Wildeman, of Brussels. The full account of the investigation, under joint authorship, will be published elsewhere.

SALICORNIA [Tournef.] Linn. Sp. Pl. 3 (1753), et Gen. Pl. ed. 5, 4 (1754) pro parte.

Salicornia et Arthrocnemum Moq. Chen. Mon. Enum. (1840) et in DC. Prodr. xiii. 2 (1849).

Salicornia Duval-Jouve in Bull. Soc. bot. France, 170 (1868).

Bentham (Flo. Austral. v. 201, 1870) reduces the whole tribe Salicornieæ to the genus Salicornia; but this plan appears to be too drastic.

Subgenus Anthrocnemum [Moq. *op. cit.* pro gen.].

Salicornia sect. 1ª, Duval-J. *loc. cit.*

1. Salicornia glauca.

S. virginica Forsk. Fl. Æg.-Arab. 2 (1775), non Linn. ("virginia") Sp. Pl. 4 (1753), nec Murray ("virginica"), Syst. Veg. 51 (1774).

S. glauca Del. Des. de l'Egypte—Flo. Ægyptiacæ—49 (1813)!

S. mucronata Lag. Mem. Pl. Barill. 58 (1817), ex Ind. Kew.

S. macrostachya Moric. Fl. Ven. i. 2 (1820).

Arthrocnemum fruticosum var. *macrostachya* Moq. *op. cit.*

A. fruticosum var. *glaucum* Moq. *op. cit.*

A. macrostachyum Mor. et Delponte in Ind. Sem. Hort. Bot. Taur. 35 (1854).

S. macrostachya Duv.-J. *op. cit.* 171!

A. glaucum Ung.-Sternb. in Atti Congr. Bot. Firenze, 283 (1874; 1876), ex Ind. Kew.

S. fruticosa auct. mult., pro parte.

The plant occurs in the salt-marshes, both inland and maritime, of the Mediterranean region from Portugal, Spain, and Morocco to Greece, Palestine, and Egypt. Records from India and Angola are based on misapprehensions.

It is a small shrub, growing eventually to a height of about a metre. Plants I saw in Algeria in the spring of last year were not quite half a metre high, but new growth had scarcely commenced. It is branched and erect. It flowers in July and early August, and ripens its seeds in September. The terminal flowering-spikes* are stout, cylindrical, blunt, and yellowish, and may grow to be 10 or even 17 cm. long. The three flowers of the cymes are subequal in size; and the central one reaches less than two-thirds of the way up the segment. The seed is black and tuberculate.

Subgenus Eu-Salicornia.
Salicornia sect. 2^a, Duv.-J. *op. cit.* 170.
Salicornia auct. mult., sensu stricto.

Section *Perennes* Duv.-J. *loc. cit.* "Flores laterales flore, medio disjuncti."

2. Salicornia fruticosa.
S. europæa var. *fruticosa* Linn. Sp. Pl. 3 (1753).
S. fruticosa Linn. Sp. Pl. ed. 2, 5 (1762).
Arthrocnemum fruticosum Moq. *op. cit.*, excl. vars.
S. fruticosa Duv.-J. *op. cit.* 172!
S. fruticosa auct. mult. (sed non auct. angl.) pro parte.

In the Index Kewensis, *S. arabica* Linn. Sp. Pl. 3 (1753) and *S. anceps* Lag. *op. cit.*, are also cited as synonyms of this species. However, *S. arabica* Linn. herb. (!) is identical with *S. arabica* Pall. herb. (!), and is *Kalidium arabicum*; and *S. glauca* Stokes (Bot. Mat. Med. i., 8, 1812) would appear to be referable to the same species. A specimen named *S. anceps* Lag. from Carthagena ("leg. Cadorini") in herb. (!) C. Bailey would appear to belong to the section *Annuæ*, since the lateral flowers meet below the central one.

S. fruticosa, sensu stricto, occurs on salt-marshes throughout the whole of the Mediterranean region, and is often a social plant. Duval-Jouve (*op. cit.*, p. 173) says that specimens were sent to him from Brittany by Mons. J. Lloyd, and from Normandy by Mons. Lebel. However, in J. Lloyd's Flo. de l'Ouest Fr. (ed. 3, 262, 1876), the northern limit of the species is given as the mouth of the Loire; and I have seen no specimens from any station north of this limit. The floras add South Africa, Polynesia, and America; but I am not certain that these localities yield the same plant. Plants collected by Major Wolley-Dod in South Africa (in herb. Brit. Mus!) are given varietal names.

The plant is a tufted dwarf shrub, growing separately in rounded tufts or intermatted as a social plant. It may attain a height of nearly a metre. The plant is erect, suberect, or ascending. It flowers in September, considerably later therefore than *S. glauca*; and perhaps therefore the two species do not hybridize, although it would appear that they frequently grow together. Its seeds ripen in November; but ripe seeds appear to be very rare in herbarium specimens. The vegetative segments are in general longer than those of *S. glauca*, and the flowering-spikes shorter. In the lower part of the flowering-spikes, the central

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* It is important to note that, throughout this account, the flowering-spikes and not the fruiting-spikes are described.

flower only reaches about one-third of the way up the segment, whilst in the upper half of the spike it reaches about half-way up. The seed is greyish, not black nor strictly tuberculate, but covered with short stout hairs.

Rouy (*op. cit.* p. 60) gives a variety *deflexa*; but perhaps this is not distinct or more than a mere state.

3. SALICORNIA PERENNIS.

S. perennis Mill. Gard. Dict. ed. 8, no. 2 (1768)!
S. radicans Sm. Eng. Bot. t. 1691 (1807)!
Arthrocnemum fruticosum var. *radicans* Moq. *loc. cit.*
S. sarmentosa Duval-J. in Bull. Soc. bot. Fr. 174 (1868)!
S. fruticosa auct. mult., pro parte.

S. fruticulosa Tineo, Cat. Plant. Hort. Reg. Panorm. 280 (1827), might, judging simply by the description, be referred to this species; but herbarium specimens seem to be distinct both from *S. perennis* and from *S. fruticosa.*

S. perennis is with certainty only known to occur in England, France (including south France), Spain, and Algeria, though it may be ultimately proved to have a wider range than this.

It is often a social plant, growing in matted clumps. Isolated tufts are sometimes a metre or more in diameter. At maturity, it is a tufted dwarf shrub, spreading centrifugally by means of freely rooting branches. The central flower of the cymes is larger than the lateral ones, which only reach about half-way up the segment. The seeds are nearly globular, and covered with slightly curved hairs, which are rather longer than those of the following species.

Rouy (*op. cit.* p. 60) divides the species into three varieties, which are perhaps mere soil forms.

4. SALICORNIA LIGNOSA.

S. lignosa Woods, Bot. Gaz. 31 (1851)!

Gürke (*Plantæ Europææ*, II. i. 158, 1897) doubtfully refers this plant to the preceding species; but the two, would appear to be quite distinct. If the two plants are to be referred to the same species, Woods's plant should be given a varietal name—*S. perennis* var. *lignosa.*

Up to a year ago, this species was only known to occur in the south of England. In the spring of 1910, however, I found the plant on the shores of the small Sebka, near Oran, in north-west Algeria. Specimens from this locality are now in the herbarium at Cambridge; and the plant was also collected in the same locality by Professor C. Schröter and Dr. E. Rübel, of Zürich. I submitted a specimen to Mr. A. Bennett, who wrote:—"Yes! It seems to me to be exactly like Woods's plant." Doubtless it will prove to be spread over a wider area when the characters which distinguish it from *S. fruticosa* and *S. perennis* become more generally known.

At maturity, it is a prostrate dwarf shrub, leaving the ground by a single stem, which grows mainly in a unilateral direction. The branches, although they lie flat on the ground, like those of

S. perennis, have no adventitious roots. The three flowers of the cyme are roughly equal in size; and the central one reaches two-thirds of the way up the segment. The seed is nearly like that of *S. perennis*, but its hairs are shorter.

Section *Annuæ* Duval-J. *op. cit.* pp. 170 and 175. "Flores laterales flore medio contigui."

Subsection *Erectæ*. Plants erect; stamens 2 or 1, if two, opening in succession.

5. Salicornia europæa.

S. europæa Linn. Sp. Pl. 3 (1753), excl. var. *β*.
S. europæa var. *herbacea* L. Flo. Suec. ed. 2, 1 (1755).
S. herbacea Linn. Sp. Pl. ed. 2, 5 (1762).
S. fruticosa Mill. Gard. Dict. ed. 8, no. 1 (1768), non Linn.
S. annua Sm. Eng. Bot. t. 415 (1797)!
S. procumbens Sm. Eng. Bot. t. 2475 (1813)!
S. acetaria Pall. Ill. Plant. 7, t. 1, figs. 1 and 2, t. 2, fig. 1 (1803)!
S. radicans Mert. & Koch in Roehl. Deutschl. Flo. ed. 3, i. 292 (1823), ex Ind. Kew., non Sm.
S. stricta Dum. in Bull. Soc. bot. Belg. 333 (1868)!
S. patula Duv.-J. *op. cit.* 175 (1868)!
S. Emerici Duv.-J. *op. cit.* 176 (1868)!
S. herbacea Syme, E. B. 3rd ed. viii. 6 (1868), incl. var.
S. herbacea Woods, *loc. cit.*!
S. herbacea auct mult., pro parte.

In the salt-marshes (both maritime and inland) of Europe and the Mediterranean region this species is very abundant, and often social. Two forms, connected by intermediates (not hybrids), are distinguishable:—

S. europæa forma stricta, form. nov. (*S. acetaria* Pall., *S. stricta* Dum., *S. Emerici* Duv.-J.). Rouy (Fl. de Fr. xii. p. 59, 1910) uses the name "*S. biennis* Afz." for this form, which he designates a "race"; but a reference to Smith's Flo. Brit. i. 2 (1800), cited by Rouy, shows it to be a mere MS. name, and one founded on a serious misconception. This form is usually a much branched and vigorous plant, with the branches fastigiate, and with the terminal spikes usually very long. It is the south European form of the species, and spreads northwards at least to Brittany, Belgium, and Essex.

S. europæa forma patula, form. nov. (*S. europæa* Linn. et *S. herbacea* Linn. in sensu stricto, *S. annua* Sm., *S. procumbens* Sm., *S. patula* Duv.-J. pro parte, *S. herbacea* var. *patula* Buchenau, Fl. Nordwestd. 192, 1894). This form has the branches spreading, that is, forming wide angles with the stem, and is usually a less branched plant than the preceding form. As a rule, its flowering-spikes are shorter. Being less vigorous than the preceding form, it frequently gets toppled over by the tides, and is then frequently misnamed *S. procumbens*. It is pre-eminently the north European form of the species. By Rouy (*op. cit.*) it is regarded as a "race"; but (according to his wont) he gives it a binomial—*S. annua*—as if it were a species. It is the prevailing form in Scotland. The two forms, as will be seen from the above citations, have received several distinctive binomials; but it is difficult to see how they can be separated specifically. Duval-Jouve (*op. cit.*, p. 176), however, states that his *S. Emerici* has straight hairs, and he so figures it; but no such annual *Salicornia* has come under my notice as yet.

S. europæa is a comprehensive and very variable species; but it must be emphasized that these variations remain perfectly distinct from the other annual species. The latter are not comparable with "species" of *Rubus* or *Hieracium*, and are so distinct (although local in their distribution), that to include them within the limits of *S. europæa* ("*S. herbacea*") seems most unreasonable.

S. europæa, usually bright green in colour, is easily distinguished from the other species of the subsection by its long, often very long (up to 5 cm. or more) flowering-spikes, which are tapering and rather obtuse. Each spike has about 8–16 flowering-segments, as a rule. The flowers are nearly equal in size, and the central one reaches about two-thirds of the way up the segment. Usually it has only one stamen, but occasionally a second (which may or may not be rudimentary) is present.

In addition to the European and Mediterranean localities, the floras give South Africa, Siberia, Central Asia, East Indies, and America; but some at least of these localities are quite untrustworthy. It is the only species of the genus which can at present be recorded from Scotland and Ireland. In the British Isles, it occurs as far north as the Orkneys and the Shetlands, and as far south as the Isle of Wight. It occurs in the Channel Isles. It is, in general, the "*Salicornia herbacea*" of botanists, who appear to be content in this genus to distinguish subgenera and not species.

[S. INTERMEDIA Woods (*op. cit.*), 30, 1851! Woods briefly described, under the name of *S. intermedia*, three erect Glassworts said to be most abundant on the muddy salt-marshes of Sussex. One of the plants resembles *S. pusilla*, but has much longer and redder spikes. The second approaches the typical form of *S.* [*europæa*] *herbacea* in its yellowish green colour, hardly tinged with red, and in its cylindrical spikes an inch or more in length and eight or nine times their width; but it has not more than eight or nine "sets of seeds." The third, in its bushy habit and colour, and in the form of its spikes, shows an affinity with *S. ramosissima*. It is obvious that one binomial cannot be retained for a medley of plants of such various origins and affinities; and the name *S. intermedia*, if used at all, should be limited to the first of these three plants.]

6. SALICORNIA RAMOSISSIMA.

S. ramosissima Woods, *op. cit.*, p. 29 (1851)!

This species occurs in the south of England, in the Channel Islands, and in Brittany. It is the prevailing species on the sandy salt-marsh at the Bouche d'Erquy. In a recent interesting paper by Miss Delf (Ann. Bot., April, 1911), it is confused with *S. annua* (= *S. europæa*). At Erquy, it is very polymorphic, in colour, size, and the amount of branching; but it remains in all its forms quite distinct from *S. europæa* and the other annual species.

In colour, *S. ramosissima* varies from apple-green to dingy red and crimson. Typically, it is much branched, often so much so as to be quite bushy; but less branched and even branchless forms occur. On the Bouche d'Erquy, these forms are definitely related to variations in the amount of water and salt in the soil, and to the degree of exposure. When well-grown, *S. ramosissima* may be as much as 30 cm. in height. The vegetative segments are usually about 10 mm. long, rarely 20 mm. The terminal flowering spikes are not nearly so long as in typical forms of *S. europæa*, and are usually not more than 5–10 (rarely up to 20, but perhaps these are hybrids with *S. europæa*) mm. long: they are acute and tapering, and usually have only 4–6 flowering segments. The central flower is about twice as large as the lateral ones, and reaches about two-thirds of the way up the segment. *S. ramosissima* seems to be the only annual species which has constantly two stamens.

7. SALICORNIA PUSILLA.

S. pusilla Woods, *op. cit.*, p. 30!

Gürke (*op. cit.*) erroneously cites this as synonymous with *S. pygmæa* Pall.; but as he also cites the latter as the original of *Halopeplis pygmæa*, his statements carry little weight.

S. pusilla seems to be a very local plant, and can at present only be recorded from salt-marshes in Sussex, Hampshire, the Isle of Wight, and Dorset.

It is grey-green in colour, and only grows to a height of about 12 cm. When well-grown, it is a branched plant with curved and graceful branches; but less branched forms occur, and these seem to have furnished the plants on which Woods based his description. The vegetative segments are about 6–10 mm. long. The terminal flowering spikes are short (5–10 mm.), with only 2–4 flowering segments, which are almost globular in shape. The lateral flowers are only about a third as big as the central one, which reaches two-thirds of the way up the segment. The hairs of the seed are long, spirally coiled, and not crozier-shaped as in the other annual species.

8. **Salicornia gracillima**, sp. nov.

S. pusilla Woods var. *gracillima* Towns. Flo. Hampshire, ed. 2, 640 (1904)!

S. (gracillima), colore viridi, rubello, vel etiam rubro; erecta, rigida, subracemosa, culmo circiter 12 cm. alto; ramis ascendentibus, haud imparibus, parallelis; horum sterilibus segmentis brevibus (circiter 5–8 mm. longis); spicis obtusis brevibus (circiter 6–12 mm. longis), 2–4 segmenta exhibentibus. Flores duos habet laterales, dimidio fere minores flore centrali, qui partem dimidiam segmenti certe superat; stamine unico. Spicæ etiam cellulas tum spirales cum spiculares continent.

At present this plant is only definitely known from the south of England, *e. g.*, Norfolk, Sussex, Hampshire, and the Isle of Wight.

In this preliminary account, full details are not given of the occurrence and distribution of the strengthening spicular cells and the water-containing spiral cells which occur in the tissues of the species of *Salicornia*; but it may here be mentioned that *S. gracillima* and *S. disarticulata* are the only annual species in which spicular cells have been found. It is difficult to understand why Townsend (*loc. cit.*) placed the plant under *S, pusilla.*

9. **Salicornia disarticulata,** sp. nov. (Plate 514).

S. (disarticulata), colore flavo-viridi, ramorum apicibus rubescentibus; erecta, rigida, ramosissima, culmo circiter 15–16 cm. alto; segmentis brevibus, ad maturitatem facile disarticulantibus, (circiter 2–5 mm. longis); spicis terminalibus brevibus (circiter 2–6 mm. longis), segmenta 3–6 exhibentibus, spicis lateralibus brevissimis (circiter 1–3 mm. longis). Differt ab omni alia specie quippe quæ spicarum segmenta singulos modo flores exhibent. Spicæ etiam cellulas tum spirales cum spiculares continent.

This species, distinguished by the ease with which the segments disarticulate at or just before maturity, and by the solitary flowers, occurs in the south of England (Norfolk, Hampshire, and the Isle of Wight) and north France (the Bouche d'Erquy). It is characteristic of the drier parts of salt-marshes, and frequently grows among turf of *Glyceria maritima.* *S. disarticulata* is, in its anatomical characters, related to *S. gracillima*; but its loosely attached segments and its constantly uniflorous "cymes" keep it separate from this and from all the other species of the genus.

Subsection *Prostratæ.* Plants prostrate or procumbent; stamen 1; hairs of seeds crozier-shaped.

The species of this subsection have been very greatly confused.

10. **Salicornia Oliveri,** sp. nov.

S. (Oliveri), colore fusco-viridi, apud autumnum ad flavo-viridem tendente; prostrata, culmo circiter 18 cm. longo, ramis duobus infimis in obtusos angulos pandentibus; figuræ triangulari approximans; ramis paucis, nunquam non prostratis; segmentis sterilibus circiter 8–15 mm. longis; spicis cylindricis robustissimis, obtusis, circiter 25–40 mm. longis, 7–10 segmenta habentibus; floribus subæqualibus—flore centrali partem segmenti dimidiam longe superante—cellulis cum spiralibus tum spicularibus nusquam apparentibus.

At present this distinct and interesting species, named after its discoverer, Professor F. W. Oliver, is only known to occur on the Bouche d'Erquy. Here it is locally plentiful on unstable sand which is subject to frequent tidal inundations. It grows with *S. perennis*, to which, unlike all the other annual species, it closely approximates in colour. It may yet be found on the south coast of England.

11. **Salicornia Smithiana,** sp. nov.

S. procumbens auct., pro parte, non Sm.

S. prostrata auct., pro parte, non Pall.

S. (Smithiana), colore viridi, rubello, vel etiam rubro; procumbens, minime ascendens, culmo brevi, circiter 15 cm. longo, ramis paucis ascendentibus; segmentis sterilibus brevibus (circiter

10 mm. longis). Flores duos habet laterales dimidio minores flore centrali, qui partem segmenti dimidiam certe superat. Celluliæ tum spirales cum spiculares nusquam apparent.

This is the plant which English authorities have recently been naming "*S. procumbens* Sm."; but Smith's description, figure, and specimen (!), and his account of its habitat prove that his plant was merely a form of *S. europæa* toppled over by the tide. It occurs in southern England from Norfolk to Somerset.

12. SALICORNIA PROSTRATA.

S. prostrata Pall. Ill. Plant. 8, t. 3 (1803)!
S. prostrata auct., pro parte.
S. procumbens auct., pro parte, non Sm.
S. patula auct., pro parte.

In addition to Russia, the plant occurs in Belgium, and in north France on the Bouche d'Erquy. It should be found in the south of England, and may prove to be rather widespread in the salt-marshes of central and southern Europe.

The plant is usually green in colour, prostrate, very much branched, the branches remaining quite prostrate, up to about 15–20 cm. in length, and triangular in outline. This and *S. appressa* differ from *S. Oliveri* and *S. Smithiana* in possessing very numerous secondary branches. From *S. appressa* it differs in its flowering spikes, which are cylindrical and obtuse. From *S. Smithiana* and *S. appressa* it differs in the much wider angles (about 90°) which the branches make with the main stem. The vegetative segments are about 8–10 mm. long, and the terminal flowering spikes about 6–12 mm. long. The lateral flowering spikes are about two-thirds as big as the central one which reaches nearly two-thirds of the way up the segment.

13. SALICORNIA APPRESSA.

S. appressa Dum. in Bull. Soc. bot. Belg. 333 (1868)!
S. prostrata auct., pro parte, non Pall.
S. procumbens auct., pro parte, non Sm.

At present, this species is known from Belgium, the Bouche d'Erquy, and the south of England. It is given the rank of a species in the Index Kewensis.

In colour it varies from a dingy red to a deep crimson. Like *S. Oliveri* and *S. prostrata*, it is a prostrate, triangular plant, but its branches are sometimes ascending at the tips. The main stem may grow to be 15 cm. or more in length. The vegetative segments are about 7–9 mm. long. The terminal flowering spikes are short (10–12 mm.), tapering, and acute. The central flower is larger than the lateral ones, and reaches nearly to the top of the segment.

KEY TO THE SPECIES.

1 { Perennial plants, small shrubs or dwarf shrubs; lateral flowers separated by the central one; stigma bifid 2
Annual plants; lateral flowers meeting below the middle one; stigma much branched 5*

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* All the British species are included in 4 and 5.

2 Seeds black, punctate, not hairy .... *S. glauca.*
Seeds greyish or greenish, hairy 3

3 Plant erect or suberect, ; hairs of seeds stout, conical... *S. fruticosa.*
Mature plant prostrate ; hairs of seed very slender 4*

4 Branches freely rooting; lateral flowers smaller than the middle one *S. perennis.*
Branches not rooting, plant leaving the ground by a single stem; flowers nearly equal in size .... *S. lignosa.*

5 Plant erect (or pseudo-procumbent owing to being toppled over by the tides, &c.) 6
Plant prostrate or procumbent 9

6 Terminal flowering spikes long (up to 3–5 cm.) ; flowers nearly equal in size ; stamens usually 1, rarely 2 .... *S. europæa.*
Branches fastigiate .... *S. europæa* forma *stricta.*
Branches spreading .... *S. europæa* forma *patula.*
Terminal flowering spikes short (usually less than 1 cm.) ; lateral flowers much smaller than the central one or absent............... 7

7 Flowering spikes acute, tapering ; stamens 2 ...... *S. ramosissima.*
Flowering spikes blunt ; stamen 1 8

8 Branches curved, graceful ; flowering segments almost globular ; hairs of seeds spirally coiled .... *S. pusilla.*
Branches simple, subequal, parallel, stout, and rigid ... *S. gracillima.*
Much branched ; segments freely disarticulating ; lateral flowers absent .... *S. disarticulata.*

9 Plants simply branched 10
Plants very freely branched 11

10 Plant prostrate ; terminal flowering spikes cylindrical, stout, obtuse, long (25–40 cm.) ; flowers nearly equal in size .... *S. Oliveri.*
Plant procumbent or ascending ; terminal flowering spikes short (1–2 cm. or less) ; lateral flowers about half as big as the central one .... *S. Smithiana.*

11 Terminal flowering spikes cylindrical, obtuse ; branches making wide angles (about 90°) with the stem .... *S. prostrata.*
Terminal flowering spikes tapering, very acute ; branches making acute angles with the stem .... *S. appressa.*

DESCRIPTION OF PLATE 514.

Drawn by Mr. E. W. Hunnybun for the New British Flora.

(a) *Salicornia disarticulata* Moss (natural size). (b) Flowering spike (× 6). (c) Seeds (× 6).

Specimens of this plant have been sent to the British and the Watson Exchange Clubs.

ALABASTRA DIVERSA.—PART XX.

BY SPENCER LE M. MOORE, B.Sc., F.L.S.

(Concluded from p. 158.)

1. NEW OR RARE TROPICAL AFRICAN PLANTS.

RUBIACEÆ.

VELVITSIA CALYCINA Hiern, Cat. Welw. Pl. p. 771. In a large collection of Mr. Gossweiler's Angola plants received at the British Museum in 1907 are flowering and early fruiting specimens from Forte Princeza Amelia (no. 2124), which seem to be conspecific with *Velvitsia calycina* Hiern. Of this latter, a Welwitsch plant, the flowers have hitherto been known only by the description given of them in the great collector's accompanying note, all his specimens being in the advanced fruiting stage, at which period their large accrescent calyces lend them a peculiar appearance, well calculated to suggest the view that the plant bearing them belongs to a special generic type. In the *Flora of Tropical Africa* (vol. iv. pt. 2, p. 362), Mr. Hemsley, still without opportunity of examining flowers, considers *Velvitsia calycina* to be a species of *Melasma* (*M. calycinum* Hemsl.). Flowers having now come to hand, it is possible to settle the question definitely.

The flower of Gossweiler, 2124, is seen on dissection to have all the characters of *Melasma*, and to agree closely with Welwitsch's description above mentioned. True, the corolla-lobes Welwitsch states to be ovate, whereas Mr. Gossweiler's note speaks of them as orbicular; in effect, when moistened and laid out on the stage of the microscope, they seem to me to be neither the one shape nor the other, but suborbicular. This slight discrepancy may perhaps be accounted for by supposing that Welwitsch's flowers had already begun to shrivel up when his note was written. Then the stamens, says Welwitsch, are attached to the middle of the tube ("medio tubo fixa"), whereas, as Mr. Gossweiler writes, they are inserted not far from the base. The older collector gives white tending towards pale yellow with violet veins for the colour of the flowers, while Gossweiler describes them as "pure white, translucent, puberulous, with longitudinal nervation in relief outside." In spite of these small points of difference, all the other characters seem so like in each as to leave no reasonable doubt that the two are conspecific.

A few notes on the flower are appended:—

Calyx florescens scabro-pubescens, 1 cm. long.; lobi 4 mm. long. Corollæ extus microscopice puberulæ tubus 1 cm. long., ima basi 4 mm., superne 8 mm. lat.; lobi inter se subæquales, suborbiculares, 8 × 7 mm. Stamina corollæ tubo 2 vel 3 mm. supra basin inserta; filamenta breviora 3 mm. longiora 5 mm. long.: antheræ 2·5 mm. long. Ovarium ovoideum, 4 mm. long.; stylus clavatus, ovarium duplo excedens, glaber; stigma hamatum, circa 3 mm. long.

GERARDIINA ANGOLENSIS Engl. in Bot. Jahrb. xxiii. 507, var. nov. **gracilis.** Ob habitum gracilem, folia angusta (modo 1·5 mm. lat.), pedicellos cito 1·5–2 cm. long. a typo plane divergit sed vix species propria esse videtur.

Hab. Angola, with *Glumaceæ* and marsh herbs on the Wawaiela rivulet, Kaconda; *Gossweiler*, 3400.

Sopubea laxior, sp. nov. Herba perennis metralis vel ultra, caule erecto tetragono sparsim vel frequentius ramoso glabro, foliis (internodiis satis distantibus) oppositis vel verticillatis vel etiam solitariis lineari-oblongis raro anguste oblanceolatis obtusis basi angustatis chartaceis pagina utraque scabridis, floribus mediocribus pedicellatis in racemis laxis paniculatis satis elongatis digestis, bracteis linearibus pedicellis brevioribus, calycis scabridi lobis tubo brevioribus deltoideis acutiusculis margine breviter

lanatis, corollæ tubo subcylindrico lobis obovatis obtusissimis tubum paullulum excedentibus, antheris cohærentibus exsertis.

Hab. Angola, common in forests towards Catemba, near Malange, and between Kutchi and Kutelo; *Gossweiler*, 1095, 1096, 3168. Between Kuma and Kutsi; *Baum*, 885.

Folia pleraque 2–3·5 cm. long., 4–7 mm. lat. (summa minora, e. g. 15 × 3 mm.), margine breviter revoluta; costa centralis pag. inf. valde eminens. Inflorescentiæ 15– fere 30 cm. long. Bracteæ ± 6 mm., bracteolæ 2 mm., pedicelli mox 5–7 mm. long. Flores albi, violaceo-oculati. Calyx totus 4·5 mm. long., lobi 1·5 mm. Corollæ tubus 4 mm. long., ima basi 2 mm., faucibus 4 mm. diam.; lobi 5 mm. long, 4–4·5 mm. lat. Antherarum loculus fertilis 3 mm. long. Ovarium late ovoideum, vix 2 mm. long.; stylus 8 mm. long., glaber.

Allied to *S. ramosa* Hochst., but differing from it chiefly in the sparser habit, the more scattered markedly broader leaves, the effuse inflorescences and longer pedicels to the flowers.

Sopubea kacondensis, sp. nov. Suffrutex caule erecto ramoso ramis erectis crebro foliosis tetragonis glabris, foliis pseudo-verticillatis aliis elongatis cum aliis multo brevioribus intermixtis linearibus obtusiusculis simplicibus vel trisectis rarius pinnatifidis supra scabriusculis subtus glabris, floribus mediocribus in spicam terminalem satis longam subdensifloram digestis, bracteis alabastra bene excedentibus vetustioribus foliis similibus junioribus gradatim imminutis lineari-lanceolatis acutis margine ciliato-lanata exempta glabris, bracteolis bracteis similibus nisi multo minoribus, calycis 5-goni usque ad medium divisi lobis lanceolatis ciliato-lanatis lobo postico ceteris latiore necnon bifido, corollæ tubo calyce breviore superne ampliato lobis late obovatis obtusissimis tubum paullulum excedentibus, antheris cohærentibus breviter exsertis.

Hab. Angola, with *Glumaceæ* in moist meadows beside the Seculu river, near Kaconda; *Gossweiler*, 4312.

Planta ex schedis cl. detectoris ultrametralis (4 ped. alt.). Folia in sicco fuscescentia, summum 5 cm. long., pleraque ± 3 cm.; segmenta foliorum minorum majoribus intermixtorum ± 1 cm. long. Spicæ circa 10 cm. long. Bracteæ ± 2 cm., bracteolæ circa 6 mm. long. Flores punicei. Calyx 10 mm. long.; lobi ·5 mm, long., lobus posticus binervosus. Corollæ tubus 4·5 mm. long., basi 3 mm. faucibus 5·5 mm. diam.; lobi 5·5 mm. long. Antherarum loculus fertilis 4 mm. long. Ovarium ovoideum, 2 mm. long.; stylus microscopice puberulus, 8 mm. long.

This has the habit of *S. lanata* Engl., which is a woolly plant with entire leaves and pedicellate flowers. The affinity is with *S. Welwitschii* Engl., but the leaves of the new plant, when not simple, are divided close to the base, and not some distance up the leaf, and among other features, the calyx is glabrous except for the woolly ciliation of its lobes.

Sopubea æmula, sp. nov. Caulibus e rhizomate crasso pluribus erectis simplicibus superne densifoliis araneoso-villosulis deinde glabrescentibus, foliis verticillatis rarius solitariis sessilibus anguste lineari-oblongis obtusis integris chartaceis utrinque pubescentibus, floribus sessilibus in spicam terminalem densam ovoideam aggregatis, bracteis anguste obovato-spathulatis apice obtusis ut bracteolæ sibi ipsis similes sed minores dorso saccatis extus araneoso-pubescentibus margine albis glandulis rubris crebro inspersis, calycis 5-goni fusco-nitidi sursum puberuli lobis tubo brevioribus triangularibus acutis marginibus breviter albo-tomentosis, corollæ majusculæ tubo superne amplificato lobis suborbicularibus tubo brevioribus, antheris inter se cohærentibus breviter exsertis.

Hab. Angola in shrubby pasturage at Kaconda; *Gossweiler*, 4240.

Planta bispithamea. Folia solemniter 2–2·5 cm. long., 2–4 mm. lat., summa breviora etsi haud angustiora in bracteas transeuntia. Spicæ nondum profecto evolutæ 4–5 × 2·5 cm. Bracteæ 9–12 mm. long., summum 5 mm. lat.; bracteolæ 5–6 mm. long. Calyx 7 mm. long.; lobi 2·5 mm. long. Corollæ tubus 10 mm. long.; inferne 1·5 mm., faucibus 3·5 mm. diam.; lobi circa 5 × 6 mm., margine crispuli. Antherarum loculus fertilis 3·5 mm. long. Ovarium ovoideum, 2 mm. long. Stylus villosus, apicem versus glaber, 13 mm. long.

Nearest *S. densiflora* Skan, but showing too many differential features to render comparison necessary.

Sopubea congensis, sp. nov. Verisimiliter planta circa bispithamea caulibus simplicibus erectis densifoliosis piloso-pubescentibus deinde glabris, foliis sessilibus inferioribus sparsis superioribus verticillatis linearibus acutis integris membranaceis primo piloso-pubescentibus mox puberulis, floribus sessilibus confertis spicam brevem terminalem cylindricam referentibus, bracteis lineari-lanceolatis acuminatis calycem facile excedentibus glandulis paucis rubris instructis ut bracteolæ lineari-oblanceolatæ calyxque albo-lanatis, calyce 5-gono ad medium usque diviso lobis triangularibus obtusis, corollæ mediocris tubo calyce vix longiore superne gradatim paullulum ampliato lobis suborbicularibus tubo æquilongis, antheris inter se cohærentibus plane exsertis.

Hab. Congo Free State, Kundelungu; *Kässner*, 2767.

Folia ± 2·5 cm. long., 1–2 mm. lat. Spicæ 3·5 × 1·8 cm. Bracteæ 8 mm. long., bracteolæ 4 mm. Calyx 5 mm. long., summum totidem lat.; lobi 2·5 × 2 mm. Corollæ tubus 5·5 mm. long., inferne 1·75 mm., faucibus 2·5 mm. diam.; lobi 6 × 5·5 mm.. margine integri. Antherarum loculus fertilis fere 4 mm. long. Ovarium ovoideum, vix 2 mm. long.; stylus crassiusculus, inferne pubescens, circa 15 mm. long.

The place of this is next *S. conferta* S. Moore, to which it has much general resemblance; its bracts and flowers are, however, different.

GESNERACEÆ.

Streptocarpus (§ ROSULATÆ) **rhodesianus**, sp. nov. Caule brevissimo radices plures filiformes emittente, foliis paucis (nonnunquam verisimiliter solitariis) sessilibus subsessilibusve oblongis vel oblongo-ovatis obtusis basi rotundatis vel obtusis margine undulatis utrinque villosis, cymis paucis pluribusve (4–15) sæpius 2–3-floris pedunculis filiformibus sat longis glanduloso-pilosis fultis, pedicellis capsula longioribus, calycis segmentis lineari-lanceolatis obtusiusculis piloso-pubescentibus, corollæ parvæ extus fere glabræ tubo quam calyx 5–6-plo longiore recto superne leviter ampliato lobis posticis rotundatis quam antici ovato-oblongi obtusissimi brevioribus, antheris conniventibus, staminodiis minutis clavatis, ovario microscopice puberulo quam stylus pilosus paullo breviore, capsula abbreviata corolla vix longiore glabrescente.

Hab. North-west Rhodesia, among rocks on the Katenina Hills; *Kässner*, 2162.

Folia summum 12 × 4·5 cm., sæpe vero multo minora (sc. 6 × 2·5 cm.), membranacea, costis secundariis circa 12 utrinque percursa. Pedunculi solemniter 5–7 cm. long.; pedicelli sub flore ± 1 cm. long., sub fructu aliquanto longiores. Calyx 1·5 mm. long. Corolla 7–10 mm. long., ima basi 1·5 mm., faucibus 3 mm. lat. Filamenta 2·5 mm., antheræ 1·25 mm. long., staminodia ·5 mm. Ovarium 2 mm., stylus 3 mm. long. Capsula (stylo persistente exempto) modo 7–8 mm. long.

To be inserted next *S. micrantha* Clarke, a species with small flowers and capsules, but quite different leaves and many-flowered cymes.

ACANTHACEÆ.

Dicliptera Monroi, sp. nov. Ramulis ascendentibus foliosis pubescentibus, foliis petiolatis ovatis breviter acuminatis basi late rotundatis membranaceis utrinque præsertim vero pag. inf. sparsim pubescentibus, spiculis pedunculatis perpaucis ramulos terminantibus cymam laxam referentibus 2-floris, bracteis inter se inæqualibus lanceolatis sat longe acuminatis ad medium usque trinervibus sparsim pubescentibus, bracteolis bracteis similibus sed paullo minoribus uninervibusque, calycis segmentis lineari-lanceolatis longe acuminatis sparsim pubescentibus, corollæ tubo bracteas bene excedente parum torto sursum aliquanto inflato labiis tubum excedentibus labio postico ovato-oblongo retuso antico tridentato æquilongo.

Hab. Rhodesia, Victoria; *Monro*, 1039.

Foliorum limbus summum 4 × 2·2 cm., modicus 2–3 × 1·2–1·4 cm., summa imminuta in bracteas transeuntia; petioli teneri, sparsim pubescentes, foliorum majorum 1–1·5 cm. long. Pedunculi 8-25 mm. long., sparsim pubescentes. Bractea major 12 mm., minor 8 mm. long.; bracteolæ 7·5 mm. Calycis segmenta 6 mm. long. Corollæ tubus extus puberulus, 12 mm. long., basi 2 mm., faucibus vix 4 mm. lat.; labium posticum 16 mm. long.; antici dentes rotundati, intermedius quam laterales major, ·5 mm. long. Filamenta 18 mm. ex corollæ tubo exserta; antherarum loculus superior 1 mm., loc. inferior 1·2 mm. long. Ovarium ovoideo-oblongum, 2 mm. long. Stylus basi sparsim pilosus, 3 cm. long.

Near *D. maculata* Nees and *D. Eenii* S. Moore. The chief points about the species are the pubescence, the rotundate bases of the leaves, and the shape of the bracts.

CYTINACEÆ.

Besides half a dozen species of *Hydnora*, this natural order is represented in Tropical Africa only by *Pilostyles æthiopica* Welw., a plant hitherto supposed restricted to Angola. The extension of its range to Rhodesia is therefore a matter of considerable interest, and there is no doubt of this, as specimens, both male and female, of a *Cytinus* sent from Victoria in that province by Mr. G. H. F. Monro (nos. 457, 962, in Herb. Mus. Brit.) are certainly referable to *P. æthiopica*.

The host of this parasite in Angola is *Berlinia paniculata* Benth. Of Mr. Monro's two specimens, the host of the female has lost its leaves, and being without flowers or fruit is therefore indeterminable. But the host of the male, also flowerless though well provided with leaves, as Mr. Edmund Baker pointed out to me, appears to be a *Brachystegia* distinct from all at the British Museum, and probably belongs to an undescribed species.

2. REMARKS ON THE GENUS *NEPENTHANDRA* S. Moore.

In the *Journal of Botany* for 1905 (p. 149, tab. 471) is described and figured as a new generic type under the above name a remarkable plant found by the late Colonel Beddome in Tenasserim. Its chief peculiarity lies in this, that with the male flowers of *Trigonostemon*, the calyx of the female flowers is largely accrescent, in this character resembling *Blachia*, *Dimorphocalyx*, and a few allied genera, which, however, have quite a different andrœcium. This character, it may be remarked, has been used, *e. g.* by Sir Joseph Hooker in the *Flora of British India* (vol. v. pp. 242–3), as a means of separating the genera presenting it from others, such as *Trigonostemon*, which have not an accrescent calyx.

In a recently published part of *Das Pflanzenreich* (iv. 147, iii. *Euphorbiaceæ-Cluytieæ*), Dr. Pax divides into four subtribes, based primarily upon the nature of the andrœcium, the genera, with few exceptions, included by Bentham & Hooker (*Genera Plantarum*, iii., part i., pp. 248–9) in the subtribe *Crozophoreæ*. These subtribes constitute the tribe *Cluytieæ*. *Trigonostemon* is placed in the subtribe *Cluytiinæ*, among genera with definite stamens, while to *Blachia* and its more immediate allies, with their indefinite stamens, are assigned positions in the subtribe *Codiæinæ*. From the clavis of this last subtribe we learn that Dr. Pax follows his predecessors in dividing the genera into two groups, namely, those with a non-accrescent and those with an accrescent calyx. Seeing this, I naturally concluded that he would have recognized precisely the same difference between *Trigonostemon* and *Nepenthandra* as of generic validity; but to my surprise found the new genus merged in the old without the essential distinction between them being assigned even sectional importance!

Dr. Pax refers to the plant in question in the following note:—"Species calyce ♀ post anthesin accrescente valde insignis, sed me judicante melius pro *Trigonostemonis* specie habenda quam pro typo generis proprii" (*l. c.* p. 93). Whatever may have been the practice in earlier days, it certainly is unusual in our time to merge in an older genus one founded on a plant which differs from its new congeners to such an extent that the term "valde insignis" can justly be applied to it. Under these circumstances I find it impossible to follow Dr. Pax in the illogical step he has taken in suppressing *Nepenthandra*.

DALMALLY PLANTS, 1910.

By Rev. E. S. Marshall, M.A., F.L.S.

I spent four weeks with my family at the excellent Dalmally Hotel, arriving late in June; there had been a month's previous drought, which continued during the greater part of our stay, to the detriment both of fishing and botanizing. Although the district has been well explored by Mr. Druce and others, some good things were obtained; those additional to Mr. Arthur Bennett's *Top. Bot. Supplement* and Rev. W. R. Linton's *British Hieracia* are starred, but some of them have no doubt already been recorded elsewhere. To Mr. Bennett, with Revs. E. F. Linton and Augustin Ley, I am indebted for critical help.

The vegetation of the granitic satellites of Ben Cruachan appears to be very poor in species; but this appearance may have been partly caused by the exceptionally dry season. Meall nan Tigearn and its northern peak, Meall nan Gabhar, south-western outliers of the Ben Laoigh group, do not seem to have been previously explored; although under 2500 ft., they produce many alpine plants, the show of *Dryas octopetala* in particular surpassing any Scottish mountain that I have visited. The distance from Dalmally being considerable, and both my visits having been interfered with by heavy rain, I am sure that a more thorough investigation would give good results.

With the exception of those made in a few hours on Ben More, v.-c. 88 Mid-Perth, all my gatherings came from v.-c. 98 Argyle.

Thalictrum minus L. (*collinum* Wallr.). River Awe, below the Pass of Brander; a few plants, in flower only, but doubtless this species.

Castalia alba Link var. *minor*. Pools at the Loch Awe end of Strath Orchy. Mr. Bennett points out that this combination was used by Link, long before the Transatlantic authors Greene and Wood. It should be noted that *Nymphæa minor* DC. (*Prodromus*, i. 116) is a N. American *species*. He gives under *N. alba* a β *minor* Besl. from Alsace, but without description; I think that Mr. Druce should stand as the authority under *Castalia*. With it occurs in plenty a small-flowered *Nymphæa lutea* L.

Arabis petræa Lam. var. *ambigua* Fr. Meall nan Tigearn; very local.

**Viola lutea* Huds. Frequent in the vale of Dalmally; the form *amœna* (Symons) is much more plentiful than the type.

**Potentilla Crantzii* G. Beck (*rubens* Vill.). Common on

Meall nan Tigearn; quite local on the Argyllshire side of Ben Laoigh.

Saxifraga nivalis L. A few plants, Meall nan Tigearn.

Carum verticillatum. Uncommon; but it was seen in two stations near Dalmally.

Œnanthe crocata L. Lusragan Burn, near Connel Ferry; a rare plant northwards, I believe.

Galium asperum Schreb. (*sylvestre* Poll.). Meall nan Tigearn.

Hieracium anglicum Fr. var. **acutifolium* Backh. A few characteristic specimens on Meall nan Tigearn; var. *cerinthiforme* Backh. also grows there, and (as a dwarf alpine state) high up on Ben More.

H. iricum Fr. Shingles of the Orchy below Dalmally, in very small quantity; not seen on the mountains.

H. gracilentum Backh. var. **graniticolum* (W. R. Linton). Abundant on one cliff, Ben a' Bhuiridh, at over 2000 ft.; stunted and monocephalous, but just like small specimens from Cairngorm. The ligules are abundantly long-ciliate, and the styles vary from dull yellow to greenish-livid.

H. senescens Backh. 88. Ben More. 98. Meall nan Tigearn.

H. Marshalli Linton. Meall nan Tigearn, typical; also a closely allied plant, which is rather doubtful between this and *H. callistophyllum* var. *cremnanthes*.

H. chrysanthum Backh. 88. Fine and locally abundant on rock-ledges, Ben More, at 3000 to 3200 ft.

H. nigrescens Willd. 88. Ben More, very rare, at 3000 ft. *98. Ben a' Bhuiridh, on granite; inflorescence typical, foliage more like that of my specimen from Glen Shee, named var. *commutatum* Lindeb. by Rev. W. R. Linton, than of our usual Breadalbane form, which appears to be not quite identical with Willdenow's type.

H. Schmidtii Tausch var. ? Ben Eunaich, on granite, at 1800 ft.; two specimens of a beautiful plant which I cannot place anywhere else, though there is some approach towards a *H. clovense* form with unblotched leaves from the Midlaw Burn, Moffatdale; the heads, however (two on each specimen), are larger and more shaggy. In one case there are three stem-leaves (two placed near the base); that is abnormal for this species, the type of which I did not observe.

H. Sommerfeltii Lindeb. var. *tactum* F. J. Hanb. Sparingly on Ben a' Bhuiridh.

H. callistophyllum F. J. Hanb. var. *cremnanthes* F. J. Hanb. Ben a' Bhuiridh, associated with the *H. nigrescens* referred to above, and much like it in foliage; the heads are about right. Both this and the following decidedly approach *H. Marshalli*, under which they were formerly placed.—Var. *glandulosum* F. J. Hanb. Ben Laoigh, very rare; a good match with my authentic specimens from Glen Etive.

H. silvaticum Gouan var. **micracladium* Dahlst. Meall nan Tigearn.

**H. oxyodus* W. R. Linton. Meall nan Tigearn; one well-grown specimen, which I queried as *H. dissimile* Lindeb. The following is Mr. Linton's opinion:—"Fits description of *H. oxyodus* remarkably well—leaves, *panicle*, phyllary-clothing, &c. I think it must be." The heads seem quite satisfactory, though the foliage is somewhat broader than in my cultivated plants, issued by W. R. Linton.

**H. variicolor* Dahlst. Very scarce on Ben Laoigh.

H. ciliatum Almq. Ben Laoigh, uncommon; rather weather-worn, but I believe correct, after careful comparison.

H. Pictorum Linton. Ben Laoigh; Meall nan Tigearn.

**H. crebridens* Dahlst. Ben Laoigh; endorsed by Messrs. Ley and Linton. It seems thoroughly characteristic, except that the ligules were noted (perhaps in error) as being pilose-tipped.

**H. breadalbanense* F. J. Hanb. Meall nan Tigearn; I also have this from near Kingshouse, Argyle. Foliage normal; heads rather more glandular than usual, but matching some of my herbarium plants, and in other respects quite satisfactory.

**H. rivale* F. J. Hanb. Ben Laoigh; Meall nan Tigearn. Some of these gatherings tend towards *H. pictorum*, and might almost equally well be referred to either.—Var. *dasythrix* Linton. Ben Eunaich (granite); Ben Laoigh and Meall nan Tigearn (mica-slate).

**H. petrocharis* Linton. Frequent on Ben Laoigh and Meall nan Tigearn. I had never before properly understood this well-marked species, which in its foliage (glaucescent, often faintly blotched) mimics some forms of *anglicum*, and also has a superficial resemblance to *H. eustales*. It varies much in the amount of stalked glands on the heads, which are very grey-floccose.

H. sagittatum Lindeb. var. **subhirtum* F. J. Hanb. Ben Eunaich; probably also on Ben Laoigh, though very near the following.—Var. **lanuginosum* Lönnr. Ben Laoigh. Confirmed by Messrs. Ley and Linton; the latter adds:—"Your specimens are more like Swedish *lanuginosum* than the Yorks specimens are; very like, in fact, only that has *very* hairy stems and petioles, and apparently yellow styles. I think it may go there as a Scottish form." I noted the styles in one case as "livid," in the other as "very dark"; the petioles and lower stem are also densely white-woolly, where the pubescence is not worn off, so that they must be nearly, if not quite, typical.

**H. rotundatum* Kit. Streamlet below Meall nan Tigearn; typical, and new for Western Scotland.

H. duplicatum Almq. var. *stenophyes* W. R. Linton. 88. West side of Ben More, at 2500 ft. *98. Meall nan Tigearn. Both gatherings were named *H. cæsium* var. *alpestre* by Mr. Linton; but the heads are much darker, still more glandular, and far less floccose than in my authentic examples of that, and the leaves (at least of the stronger specimens) are more deeply and acutely dentate, broader, and of a decided *yellowish*-green. They are a good match with my sheets from Glen Lochay and Ben Laoigh (88), certified by Rev. W. R. Linton.

H. anfractiforme E. S. Marshall. Locally rather plentiful on

Ben a' Bhuiridh and Ben Eunaich. An abnormal specimen gathered on Ben Laoigh has an umbellate inflorescence, and very long teeth on some of the leaves.

**H. acroleucum* Stenstr. var. *dædalolepium* Dahlst. Shingles of the Orchy below Dalmally; just like plants from the Shee Water so named by Rev. W. R. Linton. Mr. Ley writes:—"Certainly, in my judgment, *dædalolepium*." I must, however, confess myself unable to draw a clear line of demarcation in the dried state between these two lots and *H. vulgatum*, though they look very different when growing. *H. vulgatum* var. *sejunctum* is well marked on a wall near Dalmally Station.

H. Dewari Bosw. By the Orchy, at and below Dalmally; sometimes luxuriant.

H. stictophyllum Dahlst. Common in Strath Orchy; the form with unblotched leaves, but otherwise normal, occurs here and there with the type. A few plants were noticed on Ben a' Bhuiridh (nearly 2000 ft.) and Ben Laoigh (about 1500 ft.).

H. reticulatum Lindeb. Dalmally, very scarce. My herbarium specimens would pass very well for var. *amplidentatum* F. J. Hanb. (under *strictum*), which Mr. Linton and I consider hardly more than an exaggerated leaf-form. I cannot understand on what grounds this excellent species has been combined with *H. strictum* Fr., from which it differs widely not only in colour and habit, but in several details of importance.

**H. angustum* Lindeb. Another good species, occurring at Dalmally in two forms, or rather states, according to the open or shade-grown situation.

H. corymbosum Fr. var. **salicifolium* (Lindeb.). Banks of the Orchy, under bushes; much modified by the situation, with foliage almost efloccose beneath. Endorsed by Mr. Linton and Mr. Ley, who tells me that in Wales this is very hard to distinguish from *corymbosum*. Is this Welsh *corymbosum* quite the same as the Scandinavian and Scottish type? *Salicifolium*, as I know it, looks like a different species from the latter. In these Dalmally specimens the ligules are of an unusually pale lemon-yellow.

Taraxacum spectabile Dahlst. Rills and boggy places on the hills; I am not sure whether this has been recorded for v.-c. 98, but it is evidently common in the Highlands.

Pyrola rotundifolia L. Meall nan Tigearn.

Myosotis palustris Hill var. *strigulosa* (Reichb.). Strath Orchy, not common; *M. repens* G. & D. Don is plentiful.

Rhinanthus stenophyllus Druce (I cannot find out where, if at all, Schur published this as a species). Only seen in one spot, close to Dalmally Bridge. Among the synonyms given by Sterneck (Monograph of *Alectorolophus*) is "*R. major* var. *angustifolia* Fries, in Schedis." This was almost certainly a misprint or clerical error; Fries knew *R. major* too well to have overlooked the difference in the flowers. It seems, indeed, to be his *R. minor* var. *angustifolius*, Nov. Fl. Suec. Mantissa, iii. 62 (1843). Even if *Rhinanthus* L. cannot be retained, after shedding *Parentucellia*, &c., Mr. Druce seems to be justified in citing *Rhinanthus* Huds.;

both editions of the *Flora Anglica* preceded *Alectorolophus* All. (1785).

R. borealis Druce and *R. Drummond-Hayi* Druce occur together on Meall nan Tigearn, as well as on Argyllshire Ben Laoigh; more often I have found *borealis* by itself, and it seems to have a more general distribution in Scotland. These two plants stand well apart from our other British yellow-rattles, being decidedly alpine (they rarely descend to 1500 ft., but ascend to 3000 ft. at least), and possessing a constant character in the calyx, which is more or less thickly clothed with short, stiff, appressed hairs, and not merely ciliate, like the rest. The flowers are of a vivid though not deep shade of yellow, being frequently tinged with red-brown or inclining to orange in *R. Drummond-Hayi.* Sterneck calls the latter an autumnal plant; but I can find no appreciable difference in their flowering season. *R. borealis* is relatively stouter, unbranched, with much broader and more obtusely toothed leaves, when luxuriant; *R. Drummond-Hayi* has a more slender habit, narrower and more acutely toothed foliage, and the larger specimens produce a few small slender abortive lateral branches. When seen growing side by side they are by no means hard to distinguish, as a rule; but whether they ought to be specifically divided is a debatable point. I believe that Sterneck is fully justified in refusing to combine them with *R. grœnlandicus* Chabert, which has the calyx-surface perfectly glabrous, as Ostenfeld has done.

**Salix decipiens* Hoffm. Island in the Orchy, about a mile below Dalmally; one handsome bush, apparently not planted, nor could I see it anywhere near in cultivation.

S. arbuscula × *herbacea* (male); *S. myrsinites* L. forma *procumbens* (Forbes). Meall nan Tigearn. This mountain should repay a special search for hybrid willows, *S. arbuscula* and *S. herbacea* being plentiful, though *S. Lapponum* is scarce. I believe that I also saw a fair amount of *S. phylicifolia* and *S. nigricans*; but I had no time for detailed investigation.

Orchis maculata L. Only seen in low-lying stations, and rather local; a few white-flowered specimens occurred near the Awe, a mile or two above Taynuilt. *O. ericetorum* Linton is much more plentiful, and ascends a good way up the hills; I found them growing together in two stations, but they were too far advanced for hybrids to be determinable, if any existed.

Juncus tenuis Willd. was collected in three distinct localities, scattered over a length of eight or ten miles. 1. Roadside, four miles up Glen Orchy; a single tuft. 2. On both sides of a byroad leading from Dalmally Bridge to Craig farmhouse; abundant for nearly one hundred yards. 3. Near the terminus of a long disused railway line to some granite quarries, at 500 ft., two to three miles from Loch Awe Station, at the foot of the corrie of Ben a' Bhuiridh; scattered over a space of about thirty yards. In all these cases it was associated with other *Junci* (no fewer than five in the principal station), and no introduced plants were seen near. Evidently such artificial localities, combining sufficient moisture with plenty of drainage for the roots, exactly suit its requirements. The mineral railway habitat is particularly suggestive; there is no trace of any former cultivation, and the ballast consists of the surrounding granite rock. On the same track, but lower down (at about 300 ft.), I found a plant or two of *Potentilla Sibbaldi*, also seen at 700 ft. or less, near Socach farmhouse; this is abundant on the mountain-tops. In one case the occurrence is clearly a case of "seeding down"; why should not the same thing have happened in the other? It should be borne in mind, moreover, that the first record of *J. tenuis* as British in *English Botany*, 2174 (1810), states that it ('*J. gracilis*') was "found by Mr. G. Don in 1795 or 1796 by the side of a rivulet in marshy ground among the mountains of Angus-shire." Mr. R. A. Phillips, in a letter received last August, says: "*Sisyrinchium angustifolium* and *Juncus tenuis* are, I firmly believe, both native in Ireland."

Sparganium affine Schnizl. Pools near Loch Awe.

S. minimum Fr. Ditch in Strath Orchy, about a mile and a half below Dalmally.

Potamogeton natans L.; *P. heterophyllus* Schreb. Plentiful in the lower part of the Lusragan Burn, Connel Ferry.

**Scirpus fluitans* L. Ditches in the lower part of Strath Orchy.

Eriophorum latifolium Hoppe. Base of Meall nan Tigearn, at 1500 ft.

Carex pauciflora Lightf. was only seen low down on Ben Eunaich, but is easily overlooked.

C. canescens L. (*curta* Good.). Near the Lusragan Burn, and in Strath Orchy.

C. aquatilis Wahl. 88. The slender plant so plentiful in the bog between Ben More and Am Binnein is exactly Kükenthal's former *angustata*. Associated in good quantity with this and *C. Goodenowii* is a sterile sedge, looking intermediate in size and general habit, which I believed to be *aquatilis* × *Goodenowii*, though the short spikelets and the female glumes point rather towards **Goodenowii* × *rigida*. I did not see *C. rigida* in this station; but its pollen, wind-borne from the surrounding heights, could easily fertilize *C. Goodenowii*. Mr. Dixon (*in litt.*) asks where I can see traces of *C. aquatilis*, and his doubt is very reasonable; in fact, after careful comparison with my good series of both hybrids, I find that it (no. 3474) is exactly the same as my no. 2760 from Clova (July, 1904), which Kükenthal confirmed as *C. aquatilis* × *rigida*, "tending more towards C. Goodenowii."

C. capillaris L. Meall nan Tigearn.

C. lasiocarpa Ehrh. (*filiformis* auct.). Plentiful in the Black Loch, an old lake-bed opening out from the Lusragan Burn, and now forming a deep reed-swamp.

C. acutiformis Ehrh. (*paludosa* Good.). Lusragan Burn, two and a half miles from Connel Ferry, growing for about fifteen yards on dryish peat; a peculiar form or rather state, the leaves being less glaucous above and of a yellower green than I have seen elsewhere.

C. inflata × *vesicaria*. Frequent and variable, between Dalmally and Loch Awe, where the parents grow together in profusion. *C. vesicaria* is also locally abundant near the Lusragan Burn.

C. Grahami Boott. This and other critical sedges are dealt with in an extremely interesting paper by Mr. P. Ewing (*Annals of Scottish Natural History*, July, 1910), "On Some Scottish Alpine Forms of *Carex*." I fully agree with Pfarrer Kükenthal and him in believing that its affinity is with *C. vesicaria* rather than with *C. saxatilis* (*pulla* Good.); but when he says, "I have no doubt var. *Grahami* would soon become *C. vesicaria* if it were grown at a low elevation," facts are against him. At Kew, though it has become somewhat larger, the original Clova plant is very little modified, and remains quite distinct from our ordinary low-ground *vesicaria* forms; and this was maintained in a root transferred to Mr. Linton's garden at Bournemouth. Whether it should be reckoned as a variety or subspecies of *vesicaria* or as a distinct "critical" species really depends upon individual standards; for me, at present, the lowest appropriate rank is subspecific. Syme combined it with *vesicaria* var. *alpigena* Fr., and described the stigmas as two; but in the material which I possess, both wild and cultivated, they are invariably three.

C. Grahami × *saxatilis*. My expedition to Ben More was for the special purpose of studying afresh the puzzling sedges of this group which I had seen in 1889 below the neck which joins that mountain to its twin-peak, Am Binnein. Last summer being so dry, they did not flower as freely as usual; I failed to refind *Grahami*, but may have merely missed it, the area to be examined being considerable. I was much pleased at obtaining good specimens of this hybrid, which Mr. Ewing appears to have met with elsewhere, but not described; it may fitly bear the name × *C. Ewingii*. "Inter *C. Grahami* et *C. saxatilem* habitu plus minus intermedia, huic sæpius propior; spicula mascula solitaria, rarius abortiva, femineæ 1–2, quam in *saxatili* majores ac normaliter longiores; utriculæ valde variabiles, nunc hanc, nunc illam referentes; glumæ ad apicem conspicue hyalino-marginatæ; fructus præcipue bistigmatici, intermixtis quibusdam tristigmaticis. Sterilis videtur." In one or two cases the *saxatilis* parent was clearly the form *dichroa*, referred to below.

C. vesicaria L. var. *alpigena* Fr. The description (*Mantissa*, iii. 1842) and specimens issued by Fries in his *Herbarium Normale* agree well enough with the British examples so determined by Kükenthal; these are always bistigmatic, the female glumes being usually hyaline-tipped; they are, indeed, extremely like *Grahami* in general appearance, but might with almost equal fitness be placed under *saxatilis*. In spite of this connecting-link I quite agree with Mr. Ewing's contention that *saxatilis* deserves full specific rank.

C. saxatilis L. forma *dichroa*. This should apparently stand as of Ewing; Mr. Bennett points out that the elder Blytt (1876) placed it under *pulla*, and the younger (1906) under *vesicaria*. Living plants are very noticeable when young, because of the light-green fruit; but this dries yellowish, and so loses most of its distinctness.

Poa Balfouri Parn. var *montana* (Parn.). What I believe to be this was found in small quantity on the Argyllshire side of Ben Laoigh; it is being grown in the garden. Prof. Hackel so named a very similar grass from the Perthshire corrie, many years ago.

**Glyceria declinata* Bréb. Not uncommon about Dalmally.

Woodsia alpina Gray (*hyperborea* Br.). Rare on Meall nan Tigearn; *Cystopteris montana* Desv. also occurs there in several places.

SHORT NOTES.

EROPHILA VIRESCENS Jord. IN SCOTLAND, &c.—Last year Mrs. E. S. Gregory, of Cambridge, sent me fresh specimens of this plant from Whinnie Brae, near Galashiels, v.-c. 79. Selkirk, and from the banks of the Tweed, Melrose, v.-c. 80. Roxburgh; these are the first that I have seen from North Britain. In May of this year I took part in three excursions, conducted by Dr. C. E. Moss and Mr. E. W. Hunnybun, and observed this species about Mildenhall, Icklingham, and Cavenham, v.-c. 25. W. Suffolk; near Gamlingay, v.-c. 29. Cambridge; and plentifully near Woodwalton and Ramsey Heights, v.-c. 31. Huntingdon; so that it is probably frequent in the Eastern Counties.—EDWARD S. MARSHALL.

ALNUS GLUTINOSA (See Journ. Bot. 1907, pp. 125, 163).—It would appear that this name has been unnecessarily rejected and *A. rotundifolia* unnecessarily substituted by several recent nomenclators, as the following citation of synonyms shows:—

Betula Alnus var. *glutinosa* Linn. Sp. Pl. 983 (1753).
Betula glutinosa Linn. Syst. Nat. ed. 10, ii. 1265 (1759).
Alnus rotundifolia Mill. Abridgement Gard. Dict. 6th ed. (1771).
Alnus glutinosa Gaertn. De Fruct. ii. 54, t. 90, fig. 2 (1791).

It is clear that the two citations from the works of Linnæus refer to the same plant—our common Alder, for the designatory phrase (*Alnus rotundifolia glutinosa viridis*, from Bauhin's Pinax, p. 428) is the same in both cases. Again, it has been universally admitted that Gaertner delineated this plant; and, indeed, his descriptions and figure of the fruit and his citations leave no room for doubt. Gaertner uses the earliest trivial name, and puts the plant in its accepted genus. It is clear therefore that his combination, *Alnus glutinosa*, must stand, and that Miller's must be relegated to synonymy.—C. E. MOSS.

CENTUNCULUS MINIMUS IN CORNWALL. — In the Banksian Herbarium at the British Museum, I have recently found two specimens of *Centunculus minimus* L., labelled in Banks's hand: "Cornwal. near Penzance, Mr. Lightfoot, 1774, in moist places." This is certainly the earliest record of the plant for the county. Mr. Davey was unaware of the existence of these specimens, as in his recently issued *Flora of Cornwall* he cites Courtney, in the *Penzance Guide*, 1845, as the first recorder of *Centunculus* in Cornwall.—A. BRUCE JACKSON.

REVIEW.

The Evolution of Plants. By DUKINFIELD HENRY SCOTT, M.A., LL.D., F.R.S., President of the Linnean Society of London. Pp. 256. Cloth, 1s. net. (Home University Library.) London: Williams & Norgate.

THIS work undoubtedly furnishes a valuable contribution to our knowledge of the great question summarily described under the title of "Evolution." There was a period, not so very long ago, when writers, those especially who undertook to popularize evolutionary doctrines, professed themselves able, on an almost wholly theoretical basis, to construct with confidence the entire history of plants and animals as we find them at this day, to tell us exactly under what form their ancestors originally appeared, as well as their various transformations, and under what circumstances they have been obliged to modify themselves in order to survive in the struggle for existence. This, however, is by no means the method favoured by Dr. Scott. Starting with the principle that, however thoroughly the doctrine of Evolution is to be accepted, we can know no more concerning it than available evidence tells us, he proceeds to examine the sources from which such evidence is to be obtained, namely, the history of cultivated and domesticated species, and that preserved in the geological record. The result, while of extreme interest and importance, not only makes valuable additions to our knowledge on many points, but likewise serves to discredit much about which many earlier writers had been quite positive, and to show how dangerous it is to assume that science will always be found to accord with our speculations.

To give a few examples of what appeared to many to be obvious truths, which now are doubted or denied by the best authorities, a beginner, says our author, might naturally suppose that such plants as Duckweeds, with no regular distinction between stem and leaf, represent a primitive ancestral stage in the evolution of the higher families of flowering plants; whereas all botanists are agreed that they are really degenerate forms, degraded from higher plants, and not primitive or ancestral at all. Again, amongst Cryptogams, the Ferns and their allies are admittedly "higher" than the Mosses (Bryophytes), wherefore most botanists have believed that the former were derived if not from the latter at least from plants of that type. But this view is now much shaken, and it begins to appear more probable that the Higher Cryptogams are a more ancient and primitive form, and that the Bryophytes owe their origin to reduction from some higher type. In regard to a still wider class, it used to be thought, even by men of high authority, that the Monocotyledons must necessarily be more primitive than Dicotyledons, and accordingly appeared first; but, says Dr. Scott, it is a curious fact that none of the other fossil plants have stems like Monocotyledons, while a very great number, like the living Gymnosperms, are of the same type with the Dicotyledons.

It will thus be understood that the light of Science as it is now cast upon this perplexing subject, while it confessedly leaves many problems entirely dark, avails at least to rectify the frontiers of our knowledge, to the exclusion of a good deal we wrongly supposed to be included.

It is impossible within these limits to do more than thus generally indicate the characters and purport of Dr. Scott's book. Though obviously it has nothing in common with the romance of Natural History as set forth by imaginative writers, it is manifest that, as in so many instances, the plain truth is even stranger than any fiction, and some of the cases which are actually exhibited are more curious than fancy could have invented. Such, for example, is that of Orchids, which do not develop leaves, the place of which is taken by the roots, which turn green and flatten themselves over the trunk of the trees on which they grow, like the fronds of a Liverwort; or that of another Epiphyte, the "Old Man's Beard," which has lost its roots altogether, and hangs loose on the branches in long grey tufts, like a lichen. Extraordinary, also, are the devices of parasitical plants which live upon others. Some flowering plants find the business so profitable that they go into partnership with fungi, to which such a mode of life appears more natural. One famous parasite on Sumatran vines, which bears a flower a yard in diameter, has practically nothing else to show, stem, leaves, and roots having all disappeared, and being represented only by a web of threads, like the spawn of a fungus burrowing in the substance of its victim.

In such cases, which might be multiplied to any extent, it is clear that the adaptability of Nature is quite sufficient to account for any amount of transformation, but how much has actually occurred, and *how*, is another question, which can be settled only by careful and accurate observation.

John Gerard.

BOOK-NOTES, NEWS, &c.

Strong representations, with which we have already associated ourselves, have been made to the Prime Minister by biologists generally throughout the country, as to the inadvisability of encroaching on the site of the Natural History Museum, for the purpose of the projected new Science Museum at South Kensington. Vigorous notes of protest have been forwarded from the great societies representing Biology, as the Linnean, Zoological, Royal Horticultural, Entomological, and others; and petitions to the same effect have been extensively signed by influential workers in the various branches of biological science.

Mr. A. T. Wilmott, B.A., late Scholar and Hutchinson Student of St. John's College, Cambridge, has been appointed Assistant in the Department of Botany, British Museum. Mr. Wilmott will devote himself mainly to the study of the European and British Floras.

We regret to add to our necrology the names of Charles Larbalestier and Dr. Harry Bolus, of whom we hope to give some account in an early issue.

From a photo taken by F. Bromhead of Bristol in Jan. 1905.

Your affectionate
Augustin Ley

AUGUSTIN LEY.

(1842–1911.)

(WITH PORTRAIT.)

Augustin Ley, who died at Brampton Lodge, near Ross, after a few weeks' painful illness, on April 23rd of this year, was born in Hereford on April 3rd, 1842. He was of a Devonshire family, but his father, the Rev. William Henry Ley, after taking First Class Honours at Oxford and becoming Fellow and Tutor of his College, was at that time Head Master of the Cathedral School in Hereford—a post which, owing to rather failing health, he resigned in that year for the incumbency of Sellack with King's Capel, two contiguous parishes on opposite sides of the Wye, near Ross.

The vicarage at Sellack, built at this time, proved to be Augustin Ley's home for fifty-six out of the sixty-nine years of his very strenuous life. There, together with his brother William Clement, his senior by about a year (who also took Holy Orders and died some years ago), he was educated and prepared for the University by his father; and there he afterwards lived, first as curate and then as vicar of the combined parishes, for a further thirty years, to within three years of his death. Indeed, it was only for the four years that he held the curacy of Buxton, immediately after his ordination, that he lived out of Herefordshire, or more than a few miles from Ross and Hereford and the banks of the Wye.

His father was a great lover of nature, and encouraged his children to seek constant pleasure and recreation in the study of the natural objects around them. But such pleasure and the kindred delights of country life were always the relaxation from more vigorous intellectual work. That botany took an early place in such recreations is shown by the discovery among Augustin's papers of a *hortus siccus* dated 1848, with the names of the two brothers and of the plants in a child's writing, but with the plants themselves so well pressed and arranged as to suggest paternal guidance and help. Birds and beasts were also closely observed, and meteorology studied, especially by the elder brother, who became an expert in this branch of science. An intense love of music was early developed, and by Augustin was turned to very profitable account in after years in the training of church choirs far and wide.

His early taste for botany, first awakened by his father, was afterwards quickened by intercourse with his uncle, the late Augustin Prichard, of Bristol. I do not know what progress in this there may have been during his time at Oxford, where he entered Christ Church as a scholar and took classical honours—a first in Moderations in 1862, and a second with his degree in 1865, after having previously won the Gaisford Prize for Greek prose. In this connection he has related how Dean Liddell, while complimenting him on his composition, objected to one word in it as incorrect, and was met by the rejoinder, "I got it from your Lexicon, Sir." It is characteristic of Ley that no mention of these University honours is to be found in "Crockford."

After his ordination in 1867, and his four years' curacy at Buxton, he returned home to help his father in the care of his two Herefordshire parishes, which, with their two churches and distinct populations, could not be satisfactorily worked without the assistance of a permanent curate. It was probably during the seven years he then spent under his father's roof, as assistant curate, that he began his systematic exploration of the county, preparatory to the publication of the *Flora of Herefordshire* twenty-two years later. In his brief memoir of the Rev. W. H. Purchas, his colleague in that work (written for this Journal in 1904, pp. 80–82), he has told us how Mr. Purchas, some years before this, had mapped out the county into fourteen districts, and set to work energetically to investigate the distribution of its flora. But in 1870 Mr. Purchas had removed into Staffordshire, and from that year ceased altogether to reside in Herefordshire; so that Ley's most constant work in the field must have been done apart from his colleague. Though it was not until 1889 that the *Flora* was published, it may be convenient to mention here that in its "Preface" will be found a full account of the progress of the work, as it grew under the hands of its authors.

A short note of his, on the occurrence of *Alyssum incanum* in a field near Ross, is to be found in the 1871 volume of this Journal; and in an 1872–1874 list of members of the Botanical Exchange Club I find his name with my own. His contributions to this club (sometimes eight hundred or nine hundred sheets in one year), exceeded those of any other member, and testify to his extraordinary capacity for enduring fatigue in collecting and drying his collections, all the more remarkable when we remember how active a member he was also of the Watson Exchange Club. But it appears that his unceasing work at the *Flora* did not leave him much time for other botanical writing, as it is not until 1887 that his frequent contributions to this Journal begin. From that date onwards, however, up to the closing number of last year's volume, these contributions are of frequent occurrence and great interest, as may be seen by a reference to each year's Index.

It was in 1878 that the great sorrow of Ley's life overtook him in the death of his wife, after they had been married barely three months. From that year to 1885 he held his first incumbency, in the remote parish of St. Weonard's, half-way between Hereford and Monmouth. This he resigned at the latter date, in consequence of his father's marked failure in health, and returning once more to his old home as his father's assistant curate, he held that post again for two years, till his father's death, when he succeeded him as vicar, and with the help of a curate for Sundays, worked the two parishes for a further period of twenty-one years.

Not by one only of my correspondents has it been said of him, in almost identical terms, that "next to his duty as a parish priest, which always held the first place, his life's interest was found in botany." Right zealously, certainly, and most unselfishly did he devote himself to his work in the ministry; but none to whom he was at all intimately known could doubt that that work was all the better done for the unfailing recreation which he derived from his botanical pursuits. His keenness and thoroughness in botanical research—alike in the field and in the study—were indeed most remarkable. As the Rev. E. F. Linton writes of him; "an all-round British botanist, he took chief interest in the more difficult genera, and spent an immense amount of labour in collecting material, and working out species and varieties new to Britain and to science. In the genus *Rosa*, he revised the *mollis-tomentosa* group, a revision which was embedded in the last edition of the *London Catalogue of British Plants*. In *Hieracium* he was a large contributor to the later fascicles of the set of British Hieracia, and he continued to work at the genus to the end. The list in the *London Catalogue*, ed. 10, shows that he was responsible for five species endemic to the British Isles; and since its issue he has given specific rank to seven more—some of them previously described as varieties. An important paper on the comparative distribution of Hawkweeds in the counties of Brecon and Yorkshire appeared from his pen in this Journal for 1909, pp. 8 and 47. This he proposed to follow up with a more general paper on their distribution in the British Isles [in conjunction with Mr. Linton]—and his latest work in this direction was the preparation of his part of the proposed paper, which he posted to his colleague shortly before his death. His unexpected removal from us is a grievous and irreparable loss to all who worked with him on this intricate genus. In his knowledge of the Welsh Hawkweeds and on some sections of the genus his opinion was invaluable. Another difficult genus that he knew in the field better than any other British botanist was *Ulmus*. The result of his work is given in this Journal for 1910, p. 65; and though some revision in the nomenclature may occur in the future, there is no doubt that he knew the British forms well, and that his distinctions will stand."

Mr. Linton also refers to "his unfailing courtesy and good temper in any argument or difference of opinion, his thoughtfulness for others, and his industrious and persevering method in carrying out laborious investigations."

In *Rubus* for the last twenty years Ley has been my indefatigable and most helpful fellow-worker. No county in Great Britain or Ireland can have been nearly so well explored for its brambles as Herefordshire has been by him, with the remarkable result that it is now known to contain 136 out of the 191 forms with which the British Isles are at present credited; and with the distribution of most of them already ascertained. Of these 136 forms (83 species and 53 varieties), eleven (species and varieties) are new to science and were published by him in this Journal between 1894 and 1907. Another new species, *R. orthoclados*, was discovered by him in Monmouthshire and published in 1896. This has since been found in West Gloucester and near Namur, in Belgium. The rest are now known (chiefly through his research) to be more or less widely distributed in counties other than Hereford. Two of them are *dumetorum* forms (*triangularis* and *raduliformis*), and the permanent value of these may possibly be open to question, though to me, as to Ley, they seem constant enough. The remaining nine are distinct and strongly marked, and as such have, I believe, a secure position in our list.

The work involved in producing such results as these would have been very exacting if the worker had confined himself to the study of such a genus as *Rubus* in one large county; but it has to be remembered that his explorations in the neighbouring counties, on both sides of the Welsh border, were almost as extensive as in Herefordshire itself. There are also other forms in our list which he discovered and induced me with his help to publish from time to time. This great industry in research was due to his conviction that what is "worth being is worth knowing, and that its publication will lead into fuller truth" (*Journ. Bot.* 1908, 69), a conviction which made him unwilling to disregard, as if abnormal, any fairly abundant but apparently undescribed plant that he met with. In some few cases other experts may not be agreed as to the value of the additions thus made; but I may be allowed to express the opinion that if his new Rubi are a fair sample of their real importance, there can be no question as to our indebtedness to him for his work in this direction.

In *Pyrus*, another genus of the same family as *Rosa* and *Rubus*, Ley's interest was unflagging from 1895, when his first note on his new species, *P. minima*, appeared in this Journal; and the lasting value of what he has done in the elucidation of this genus has been recognized on the Continent as well as among us.

As to his knowledge of Mosses, so good an expert as the Rev. C. H. Binstead writes: "He took up mosses quite early in his botanical career, and used to be one of our best workers. From 1900 he did but little, his eyesight being not quite keen enough after that date. . . . It is noteworthy, however, that it is due to his perseverance that a moss, *Eurhynchium abbreviatum*, was added to the list of British species. It had always been mistaken for *E. Swartzii*. Ley would not admit the identity, and his friend Boswell, of Oxford, at last identified the species, which was well known on the Continent. Up to the last he was always interested in the mosses."

As has been stated above, the *Flora of Herefordshire* was published in 1889. In pp. 217–220 of this Journal for that year appears an appreciative review by the Rev. E. S. Marshall. This work, the fruit of so many years' painstaking research, at once took a foremost place among our county floras, and has held it ever since. One of its conspicuous excellences is the frequency of brief critical notes, breaking the monotony of locality lists and proving of great help to less skilful botanists than the authors.

The Flora was followed by the publication in this Journal of numerous supplementary papers by Ley, those in the 1894 and 1896 volumes being of especial interest. He also contributed the greater part of the botanical section to the *Victoria History of the County of Herefordshire.* His large and valuable herbarium now goes to the University of Birmingham.

In addition to his frequent botanical rambles in most parts of Wales, and his very exhaustive exploration of his own county, Ley made expeditions from time to time to widely separated parts of the British Isles. His travels on the Continent—in Norway, the Tyrol, Switzerland, Normandy and Brittany, and the Riviera—were frequent, though chiefly in earlier years. To Norway his first visit was as early as in 1863, when, with his father and brother, he explored neighbourhoods so unfrequented by tourists and under such primitive conditions that they were glad to eat the dog-biscuits which they had taken with them for their unfortunate dogs. But in his case, as of course with all vigorous natures, discomforts and hardships out of the common only added zest to the pleasure of exploration.

In 1908, little more than two years before his death, conscious no doubt of somewhat failing health, he resigned his incumbency, and with his stepmother (always his zealous fellow-worker in the parish) removed to a cottage near Ross. At the same time he placed himself on the Bishop of Hereford's Emergency List, and so to the end was constantly employed in helping his neighbours; often taking the full charge of a parish, as he did last winter up to the middle of February.

One of his most intimate botanical friends in recent years writes of him: "What a delightful companion he was! . . . not only a botanist, but a thoughtful and well-read man; and men and women who knew nothing of botany always enjoyed his conversation." It could hardly have been otherwise. He was so frank, so refreshingly vigorous and unconventional, so outspoken and yet considerate, and under all circumstances so full of cheery optimism, that none could altogether miss the charm of his companionship. He was so ready also to let you share in his ripe knowledge. When he could not agree with you, he lost no time in letting you see it, but always courteously and in such a way as to give you an impression of his readiness to learn anything that you might be able to teach, however contrary it might be to the conviction he had previously reached; so that to many who knew him well intercourse with him was as cheering and bracing as a tonic. And all the more when one learned, as one soon did, that his breezy optimism was the reasoned outcome of candid consideration and real experience. It was not that he failed to see difficulties and dangers ahead in matters of deepest moment, but that he realized to the full how common a thing it is for the most satisfactory results to be thus reached. Hence the hopefulness which nothing damped, and the patience which often shamed one.

"In many ways an ideal parish priest of a rural parish," as was said of him at a large gathering of churchmen in Ross Church the day before his funeral, "kindly and generous-hearted, yet withal shrewd and practical, his was one of those lovable natures which attract to themselves all who come in contact with them." "The restored church at St. Weonard's," to quote yet one witness more, "and the bridge over the Wye built by his exertions 'to the honour of God, the lasting union of the two parishes'—of Sellack and King's Capel—'and the use of all,' testify to his care for the spiritual and general welfare of his parishioners; but those who knew him personally will be helped most by the recollection of his example of 'plain living and high thinking,' and of the purity and sunny simplicity of a life wholly dedicated to the service of the God of redemption and of nature."

His body was laid to rest among his people in Sellack churchyard, and this was the comment of a friend who was present, "I never saw so many persons at a country funeral before."

W. Moyle Rogers.

A REVISION OF THE GENUS *HAMELIA*.

By H. F. Wernham.

This genus of *Rubiaceæ* is confined to the New World, the earliest types described being the West Indian *H. erecta* and *H. patens*, upon which Jacquin (Stirp. Amer. 72, t. 50, 1763) founded the genus.

Hamelia, comprising shrubs chiefly, with a few trees, is readily distinguishable as a genus by the regularly secund arrangement (except *H. chrysantha*) of the subsessile flowers in the cymes, and by the external appearance of the flowers themselves. The latter are usually tubular, often angled, with erect, inconspicuous corolla-lobes; the stamens have long and linear anthers basi-fixed upon short membranous filaments inserted shortly above the base of the corolla-tube. A large floral disc is typically present, and this often persists as a large crown in the multilocular berry. The seeds are numerous, very rarely more than 1 mm. in their maximum dimension—usually much less—and more or less coarsely foveolate.

Of the species dealt with in the present paper, *H. patens* Jacq. is by far the commonest and the most widely distributed, occurring as far north as Florida, and generally over Central America, the West Indies, Tropical South America and Brazil, and appearing south of the tropics, in Paraguay. *H. lutea* is next in order of wideness of distribution, although much rarer than *H. patens*, being found in various localities of the West Indies, in Central and South America, including Brazil. *H. chrysantha* is recorded as from Mexico, Jamaica, and Venezuela—widely separated districts. In all the other cases the distribution is, so far as our present knowledge goes, local only, in various parts of the West Indies, and Central and Tropical South America.

Mexico is an important centre of distribution, with at least eleven species; seven species occur in the remaining portion of Central America; seven in the West Indies; ten in Tropical South America, of which two only are recorded for Brazil.

Specierum Clavis.

- Flowers with relatively long pedicels, terminating the branches of forking cymes. Leaves usually opposite, or sometimes 4-nate, glabrous .... 1. *H. chrysantha.*
- Flowers sessile, subsessile, or but shortly pedicellate, secund upon the branches of forking cymes.
  - Corolla 2·5 cm. or more in length (in *H. magniloba* barely 2·5 cm.), more or less widened above.
    - Mature leaves glabrous, or slightly pubescent only on the veins beneath.
      - Calyx-lobes not less than 5 mm. long ... 2. *H. calycosa.*
      - Calyx-limb very shortly toothed.
        - Corolla-lobes 8–9 mm. long, patent ... 3. *H. magniloba.*
        - Corolla-lobes seldom exceeding 3 mm., erect.
          - Leaves 20–25 cm. long; seeds distinctly pear-shaped .... 4. *H. grandiflora.*
          - Leaves rarely exceeding 12 cm.; seeds not pear-shaped.
            - Berry subglobose, seeds 1 mm. and more across, with fine reticulum and dull surface 5. *H. cupræa.*
            - Berry oblong, seeds not exceeding ½ mm., with coarse reticulum and glistening surface 6. *H. ventricosa.*
    - Mature leaves with manifest indumentum, between as well as upon the veins beneath.
      - Leaves ovate, 6·5–9 cm. × 4–5·5 cm., puberulous above .... 7. *H. hypomalaca.*
      - Leaves elliptic-oblong, 10–12·5 cm. × 4·5–5 cm., glabrous above .... 8. *H. xorullensis.*
  - Corolla rarely exceeding 2 cm. in length.
    - Leaves opposite.
      - Leaves glabrous.
        - Corolla campanulate above .... 9. *H. lutea.*
        - Corolla tubular throughout.
          - Leaves elliptic-lanceolate, flowers mostly exceeding 1 cm. in length.
            - Leaves 5–6 cm. long........ 10. *H. axillaris.*
            - Leaves 15–24 cm. long........ 11. *H. magnifolia.*
          - Leaves almost orbicular, flowers mostly less than 1 cm. in length........ 12. *H. breviflora.*
      - Leaves not glabrous.
        - Corolla and fruit glabrate........ 13. *H. rostrata.*
        - Corolla and fruit clothed with dense yellowish hairs .... 14. *H. xerocarpa.*
    - Leaves whorled.
      - Stamens reaching, or almost reaching, the mouth of the corolla, often exceeding it.
        - Calyx-teeth relatively long, usually revolute.
          - Corolla-tube glabrous........ 15. *H. ovata.*
          - Corolla-tube hairy on the outside... 16. *H. Rovirosæ.*
        - Calyx-teeth very short, deltoid, usually adpressed to corolla base.

Leaves scabrid above with scattered papillæ,
    often suborbicular .... 17. *H. papillosa.*
Mature leaves glabrate, or with slight indumentum only on under midrib.
    Flowers mostly with manifest pedicels
        18. *H. pedicellata.*
    Flowers almost or completely sessile.
        Leaves, petioles, and calyces purplish; anthers with purple apical membranous process (ex descr.)... 19. *H. suaveolens.*
        Plant without purple tint; anthers without any conspicuous apical process.
            Leaves mostly 3-nate.
                Corolla-tube scarcely swollen at base
                    20. *H. tubiflora.*
                Corolla-tube markedly ventricose at base
                    21. *H. versicolor.*
            Leaves mostly 4-nate.
                Cymes terminal, branches nodose
                    22. *H. nodosa.*
                Cymes borne on short axillary shoots; branches not nodose ... 23. *H. viridifolia.*
Mature leaves with manifest indumentum, between as well as upon the veins, at least on the under side.
    Branches terete, vegetative parts generally of reddish tint, berry globose. Margin of calyx-limb almost entire (ex tab.)
        24. *H. sphærocarpa.*
    Branches sulcate, plant without red colour, berry not globose, calyx-limb distinctly toothed.
        Stem and inflorescence densely covered with ferruginous hairs ... 25. *H. lanuginosa.*
        Hairy covering not remarkably dense nor ferruginous .... 26. *H. patens.*
Stamens not exceeding the middle of the corolla-tube
    27. *H. brachystemon.*

1. HAMELIA CHRYSANTHA Swartz, Prodr. 46 (1788); DC. Prodr. iv. 442.

Hab. Mexico: *Hænke.* Jamaica: *Swartz*! *Harris*, Fl. Jam. 9365! in Hb. Mus. Brit. Chilua: *Hb. Moore*! in Hb. Kew.

This species is peculiar in the inflorescence; the flowers have relatively long pedicels, and are not arranged in the manifestly secund manner of those of the other species. The flowers may attain a length of over 2 cm., and are sometimes appreciably widened above; so that *H. chrysantha* may represent a transition to the large-flowered forms of the *H. ventricosa* type. The leaves are defined as opposite in the type description. One plant, however, in the Kew Herbarium (Chilua: *Hb. Moore*) bears the leaves in whorls of four, but appears to differ in no other way from the type of *H. chrysantha*. This may be a variety; but in the absence of further material, it may be well to refrain from any separate description.

2. H. CALYCOSA J. D. Smith in Coulter Bot. Gaz. xii. 132 (1887).
Hab. Pansamala, Guatemala: *Türckheim*, 454! Hb. Kew.

3. **H. magniloba,** sp. nov. Foliis nisi subtus super venam mediam glabratis verticillatis, corolla inter majores lobis pro genere magnis patentibus.

Hab. Chontales, Nicaragua: *Tate*, 200! Hb. Kew.

Arbor, ramulis complanatis glabrescentibus, foliis membranaceis ellipticis ca. 15 cm. × 7 cm. brevissime acuminatis apice subacuto basi angustatis utrinque glabris nisi subtus super venam mediam et in axillis cum costis secundariis sparsissime puberulis petiolis 3–3·5 cm. longis, cymis brevissime ferrugineo-pubescentibus floribus plerumque pedicellatis, calyce toto 3 mm. tubo subcylindrico vix pubescente limbo minutiusculo dentibus late deltoideis, corollæ tubo 2·2 cm. longo sursum leniter ampliato (in ore ad 7 mm. lato) externe pubescente lobis patentibus ovatis acutis 9 mm. longis dorso pubescentibus, staminibus linearibus filamentis membranaceis complanatis ca. 7 mm. longis antheribus 8 mm., stylo glabro complanato, bacca parvula, seminibus valde complanatis.

This species is conspicuous for its large corolla-lobes and the approximate equality in length of anthers and filaments.

4. **H. grandiflora** Spruce MS. in Hbb. Mus. Brit. et Kew. Foliis glabris verticillatis, floribus magnis calycis et corollæ lobis pro rata parvulis, seminibus pro rata magnis pyriformibus.

Hab. Chimborazo: *Spruce*, 6193! *Triana*, 1759!

Arbor, ramulis glaberrimis complanatis vel angulatis, foliis pergamaceis verticillatis ellipticis vel elliptico-oblongis 20–25 cm. × 9–10 cm. breviter acuminatis subacutis basi brevissime angustatis vel subrotundatis utrinque glaberrimis nisi subtus super venas minutissime puberulis petiolis 5–9 cm. longis, stipulis lanceolatis obtusis coriaceis plus minus persistentibus 2–4 mm. longis, cymis glabratis terminalibus vel axillaribus in ramulorum furcis multifloris ramosissimis floribus plerumque manifeste pedicellatis, calycis tubo 4·5 mm. long. cylindrico valde sulcato glabro limbo 1·5 mm. long. dentibus brevissimis necnon subcarnosis concaveis subacutis, corollæ tubo 2·7 cm. long. sursum ad 1 cm. lat. ampliato glabro basi valde ventricoso lobis latis 2·5 mm. long. ovato-oblongis acutis, staminum linearum antheribus 2·1 cm. long. inclusis connectivo ad apicem in parvam laminam ovatam producto filamentis 5 mm. long. 4 mm. supra corollæ basin insertis, stylo filiforme 2·8 cm. long. stigmate anguste clavato subcostato, bacca ovato-lanceolata glabra 1 cm. long. × 5·5 mm. lat. disco ca. 2 mm. alto coronata, seminibus ·8–1 mm. long. manifeste pyriformibus.

5. H. CUPRÆA Grisebach, Fl. Brit. W. Ind. 320 (1864).
Hab. Jamaica: *Marsh*, 1772! *Harris*, Fl. Jam. 5271! 7705! 9343! 9635! Cuba: *Wright*, 2664! Hb. Mus. Brit.; Hb. Kew.

6. H. VENTRICOSA Swartz, Prodr. 46 (1788). *H. grandiflora* L'Hérit. (non Spruce) Sert. Angl. 4; *H. pauciflora* Willd. ex Spreng. Syst. i. 765.

Hab. Jamaica: *Alexander*! *Macfadyen*! *Distan*! *Shakespear*!

Wright! *Swartz*! *Cuming*, 18! 50! *Fawcett*, Fl. Jam. 8750! *Harris*, Fl. Jam. 9355! Hb. Mus. Brit.; Hb. Kew.

7. H. HYPOMALACA Robinson in Proc. Am. Acad. xlv. 406 (1910).

Hab. Mexico, Durango: *Rose*, 2304.

8. H. XORULLENSIS H. B. & K. Nov. Gen. et Sp. iii. 414 (1818).

Hab. South Mexico, Jorullo: *Humboldt & Bonpland*. Colima: *Palmer*, 1164! Hb. Kew.

9. H. LUTEA Rohr ex Smith in Rees, Cycl. v. 17, n. 4 (1811). *H. chrysantha* Jacq. Coll. iii. 204 (non Swartz).

Hab. Ind. Occ.: *Von Rohr*! Jamaica: *Purdie*! *Marsh*, 627! *Harris & Britton*, Fl. Jam. 10537! *Thompson*, Fl. Jam. 6473! Porto Rico: *Sintenis*, 1458! 2778! *Eggers*, 2816! S. Domingo: *Türckheim*, 2782! St. Thomas: *Eggers*, 351! Cuba: *Wright*, 234! 1265! Costa Rica: *Tonduz*, 10052! 7052! Panama: *Hayes*, 364! Nicaragua: *Tate*, 198! 199! *Seemann*, 114! 136! 137! Colombia, S. Marta: *Smith*, 1818! Trinidad: *Purdie*! Peru: *Spruce*, 4231! Brasil: *Poeppig*, 2160; *Ule*, 5454! Hb. Mus. Brit.; Hb. Kew; Hb. Univ. Cambridge.

This species is readily recognizable by its opposite leaves, small campanulate corolla, and longish subfiliform calycine teeth, often somewhat curled.

10. H. AXILLARIS Swartz, Prodr. 46 (1788); Fl. Ind. Occ. i. 443; DC. Prodr. iv. 442. *H. appendiculata* Gaertn. f. Fruct. iii. 64; *H. lucida* Desf. Tabl. ed. ii. 135.

Hab. Jamaica: *Swartz*! *Wright*! Hb. Mus. Brit.; *Tonduz*, 9998! Hb. Kew.

Var. *β appendiculata* DC. Prodr. iv. 442. I have had no opportunity of seeing this plant; it is recorded as collected in Porto Rico.

Grisebach (Fl. Br. W. Ind. 320) merges this species in *H. lutea* Rohr, describing it as "a form with the cymes exceeded by dichotomous branches." Swartz, however, describes the corolla as tubular, as is that of the specimen in the National Herbarium collected by him, which is quite distinct from *H. lutea*; I see no reason, therefore, why *H. axillaris* should not be maintained.

11. **H. magnifolia**, sp. nov. Foliis magnis glaberrimis oppositis, floribus in cymis glabris sessilibus, corolla inter minores tubulosa sursum vix ampliata.

Hab. Costa Rica: *Pittier & Durand*, 10091! Hb. Mus. Brit.; *Pittier*, 9904! Hb. Kew.

Arbor glabra, ramulis complanatis, foliis firme pergamaceis oppositis elliptico-lanceolatis 19–24 cm. × 7–9·4 cm. leniter acuminatis apice obtuso basin versus angustatis utrinque glaberrimis petiolis superne canaliculatis 2·5–4 cm. longis, stipulis subulatis truncatis mox deciduis vix 5 mm. longis, cymis verisimiliter terminalibus ramosissimis multifloris necnon laxiusculis floribus sessilibus, calycis totius 3·3 mm. longi tubo cylindrico glabro valde sulcato lobis minutiusculis demum subcarnosis, corollæ tubo subcylindrico 1·5 cm. longo sursum vix ampliato glabro ad basin valde ventricoso manifeste quinquecostato lobis latiusculis ca.

1 mm. longis triangularibus obtusis, staminibus linearibus filamentis 3 mm. longis plus minus complanatis ca. 4·5 mm. supra corollæ basin insertis antheribus 7·2 mm. longis nec exsertis, stylo filiforme complanato 1·3 cm. longo, bacca elliptico-oblonga glabra vix sulcata, seminibus manifeste foveolatis ·5 mm. diam.

A very distinct species, having affinities with *H. lutea* Rohr, but recognizable by its large leaves and small tubular flowers in large glabrous cymes.

12. H. BREVIFLORA A. Rich. Fl. Cub. ii. 17 (1853).

Hab. Cuba, in montosis prope Santiago: *Linden*, 2048.

Conspicuous for its broadly ovate, suborbicular leaves and small flowers.

13. H. ROSTRATA Bartlett ex DC. Prodr. iv. 442 (1830).

Hab. Mexico, Acapulco: *Hœnke*.

14. H. XEROCARPA Kuntze, Rev. Gen. Pl. 284 (1891).

Hab. Nicaragua: *Seemann*, 120! Hb. Mus. Brit.; *Tate*, 222! Hb. Kew.

15. **H. ovata,** sp. nov. Foliis glabris verticillatis, floribus sessilibus secundis, corolla inter minores glabra staminibus corollæ tubum subæquantibus, calycis dentibus longiusculis.

Hab. Venezuela: *Funcke & Schlim*, 538! Hb. Mus. Brit.

Frutex (?), ramulis compressis glabris, foliis verticillatis glabris ovatis 9–11 cm. × 5–6 cm. basi brevissime acutis vel subrotundis apice breviter acuminatis acutis, stipulis parvis crassiusculis deltoideis persistentibus, cymis terminalibus subglabris breviter pedicellatis, calyce infundibulari vix pubescente lobis oblongis truncatis sæpius revolutis 2–3 mm. longis, corolla tubulosa 1·4 cm. longa glabra basi ventricosa, staminibus linearibus corollæ tubum subæquantibus, bacca . . .

Related to *H. Rovirosana*, but readily distinguished by its almost complete glabrousness, and by the shape of the leaves.

16. **H. Rovirosæ,** sp. nov. Foliis glabratis verticillatis, calycis lobis revolutis pro rata longiusculis, corolla inter minores tubulosa extus pubescente-hirta.

Hab. Marshes on banks of S. Sebastian River, Tabasco, Mexico, *Hb. Rovirosa*, 499! in Hb. Kew.

Verisimiliter frutex ramulis teretiusculis sparse pilosis, foliis 3-nis ellipticis 5–10 cm. × 2·5–4 cm. utrinque angustatis apice acuto petiolo 5 mm.–1·4 cm. utrinque glaberrimis nisi subtus præsertim super venam mediam et in axillis cum costis secundariis sparse pilosis, stipulis deltoideis apice in filamentum ad 5 mm. longum acuminato, cymis terminalibus laxiusculis pubescentibus breviter pedicellatis, calyce sparse piloso lobis lineari-oblongis apice truncato ad 3 mm. longis revolutis, corolla tubulosa basi vix ventricosa extus subhispidula, staminibus linearibus, stylo filiforme basin versus plus minus ampliato.

I have not seen a fully opened flower of this species; but it may be readily distinguished by the length and shape of the calyx-lobes and the indumentum of the corolla.

17. H. PAPILLOSA Urban, Symb. Antill. v. 508 (1908).

Hab. Jamaica: *Harris*, Fl. Jam. 8747! in Hb. Mus. Brit.; *Harris*, Fl. Jam. 8957! Hb. Kew.

18. **H. pedicellata,** sp. nov. Foliis glabratis verticillatis, floribus plerumque pedicellatis secundis, corolla inter minores.

Hab. Colombia, Santa Marta: *Smith*, 394! 1817! *Von Rohr*, 65! Trinidad: *Fendler*, 446! Dominica: *Anderson* ex herb. Forsyth in Hb. Kew! St. Vincent's: *Rev. L. Guilding* in Hb. Kew! Hb. Mus. Brit. and Hb. Kew. The specimen from the herbarium of C. M. Lemann, cultivated in the Serampore garden (Hort. Bot. Calc.), and now preserved in the Cambridge University Herbarium, must also be referred to this new species. The native locality is given as "N. of S. America," and the plant is named *Hamelia patens*.

Frutex (?), ramulis glabrescentibus subfistulosis, foliis sæpius 4-natis ovatis vel ellipticis 10–12 cm. × 4–5·2 cm. breviter acuminatis acuto apice basi brevissime acutis vel vix rotundatis utrinque glabratis subtus cystolithis densiuscule distinctis petiolis 1–1·5 cm. longis, stipulis lanceolatis obtusis 2 mm. longis, cymis plerumque terminalibus multifloris minute et sparse pubescentibus floribus sæpius pedicellatis, calycis tubo campanulato 2·5 mm. longo vix pubescente lobis brevissimis basi lato triangularibus, corollæ tubo 1·5 cm. longo sursum leniter sed paucissime ampliato glabro basi ventricoso lobis brevissimis truncatis ad 2 mm. latis, staminum linearum antheribus 7 mm. filamentis 5 mm. longis 4 mm. supra corollæ basin insertis tubum vix excedentibus, stylo filiforme 1·5–1·6 cm. longo basi aliquantulum dilatato stamina subæquante, bacca glabra oblonga v. ovato-lanceolata 7–9 mm. × 3–4·5 mm. pedicella ad 3 mm.

19. H. SUAVEOLENS H. B. & K. Nov. Gen. Am. iii. 414. *H. odorata* Willd. ex Roem & Schult. Syst. v. 267.

Hab. Near Garapatas, Badillas, &c., banks of R. Magdalena.

20. **H. tubiflora,** sp. nov. Foliis verticillatis glabratis nisi subtus nonnunquam super venam mediam obscure pubescentibus corolla inter minores tubulosa nec ventricosa glabra.

Hab. Colombia, Barranquilla: *Holton*! Santa Marta: *Purdie*! Hb. Kew.

Frutex (?) ramulis glabris, foliis ternatim verticillatis ellipticis 6–12 cm. × 3–5 cm. glabratis sæpius cystolithis dense distinctis breviter acuminatis subacutis basi brevissime angustatis vel subrotundatis petiolis ad 2 cm. longis, stipulis deltoideis persistentibus vix 2 mm. longis, cymis terminalibus necnon axillaribus glabratis vel minutissime pubescentibus paucifloris, calycis tubo 1·5–2 mm. longo glabriusculo obconico lobis ·8 mm. longis triangularibus basi lato et apice subacuto, corollæ totius 1·65 cm. longæ tubo glabro cylindrico aliquantulum basi ampliato nec ventricoso lobis vix 1 mm. × 1 mm. ovato-oblongis apice obtuso, staminum linearum antheribus 1 cm. longis basi brevissime sagittatis filamentis 5·5 mm. longis 3·5 mm. supra corollæ basin insertis, stylo 1·5 cm. longo filiforme stigmate parum manifesto, bacca parva glabra ovato-oblonga.

Nearly related to the Mexican *H. versicolor*, but distinguished especially by the shape of the corolla-tube and the size and shape of the fruit.

21. H. VERSICOLOR Gray ex S. Wats. in Proc. Am. Acad. xxii. 416 (1886).

Hab. Barranca, Mexico: *Palmer*, 125! *Pringle*, 2569! 9828! San Blas: *Lay & Collie*! Hb. Mus. Brit.; Hb. Kew.

This species is notable for its relatively large globose berries, about 8 mm. in diameter.

A curious inaccuracy appears in the original description of this species, the number of stamens being given as "sæpius 7." The pentamerous condition of the andrœcium is so constant throughout the genus that the presence of a larger number of stamens in any flower under examination would reasonably arouse some suspicion of abnormality. I have, however, dissected several flowers of the type-plant itself (*Palmer*, 125), but in no case was the number of stamens other than 5; and this applies also to the other specimens examined.

22. H. NODOSA Mart. & Gal. Bull. Acad. Brux. xi. i. 234 (1844).

Hab. South Mexico, near Mirador, at 3000 ft.: *Galeotti*, 2581.

23. **H. viridifolia,** sp. nov. Foliis glabratis verticillatis, cymis in ramulis brevibus lateralibus dispositis corolla inter minores, seminibus minutissimis vix foveolatis.

Hab. Costa Rica: *Tonduz*, 13,867! in Hb. Kew.

Arbor (?) ramulis junioribus sparse pubescentibus sulcatis senioribus glabris obscure quadrangulatis, foliis 4-nis ellipticis 4–5 cm. × 2–2·5 cm. vix acuminatis apice obtusiusculo basin versus vix angustatis utrinque nisi immaturis glabris crassiusculis superne olivaceo-viridis subtus multo lævioribus petiolis ad 5 mm. longis obscure pubescentibus et nonnunquam subalatis, stipulis crassis deltoideis mox deciduis, cymis ramulos axillares terminantibus laxiusculis pubescentibus floribus sessilibus, calycis tubo campanulato 2·3 mm. longo pubescente lobis minutis (·7 mm. longis) deltoideis, corollæ tubo subcylindrico 1·7 cm. longo sursum parum ampliato glabro ad basin vix ventricoso lobis ca. 1 mm. longis late triangularibus subtruncatis, staminibus lineari-clavatis filamentis complanatis 3·8 mm. longis ca. 2·2 mm. supra corollæ basin insertis antheribus 7·8 mm. longis ca. 2 mm. exsertis, stylo filiforme 1·2 cm. longo corollæ tubum subæquanti, bacca elliptica tenuiter pubescente, seminibus pro genere minutis necnon vix foveolatis.

This species seems to have affinities with the Mexican *H. nodosa* Mart. & Gal., but is distinct in the relative smallness of its leaves and flowers, the arrangement of the inflorescences, and the character of the seed.

24. H. SPHÆROCARPA Ruiz & Pavon, Fl. Per. ii. 69, t. 221, fig. *b* (1799).

Hab. Peru, woods, Chinchao Quebrada, near Challana: *Ruiz & Pavon.*

Closely related, apparently, to *H. patens*; according to the figure, the most notable differences are the shape of the fruit and the entire absence, in this species, of calycine teeth.

25. H. LANUGINOSA Mart. et Gal. in Bull. Acad. Brux. xi. 1, p. 233 (1844).

Hab. South Mexico, Jalapa, Mirador, &c.: *Galeotti*, 2615.

Pringle, 8150! and Botteri, 502! in Hb. Mus. Brit. seem to answer to the description of this species; but in view of the extensive range of variability in the indumentum of *H. patens*, I am unable to decide the point without consulting the type of *H. lanuginosa*, which has hitherto been unavailable to me.

26. H. PATENS Jacq. Stirp. Amer. 72, t. 50 (1763); DC. Prodr. iv. 441; K. Schumann, Fl. Bras. VI. vi. 322. *H. chrysantha* Sieber ex Steud. Nom. ed. II. i. 721; *H. coccinea* Swartz, Prodr. 46; *H. erecta* Jacq. Enum. Pl. Carib. 16; *H. latifolia* Reichb. ex DC. Prodr. iv. 442; *H. verticillata* Moç. & Sessé ex DC. Prodr. iv. 442. To the list of synonyms must be added *Schœnleinia thyrsoidea* Miers, in Proc. Roy. Hort. Soc. iv. 186. The type of this plant was collected at Rio Magdalena, New Granada, by Weir (no. 26), and passed, with Miers's collection, into the National Herbarium. The type is accompanied by sketches of Miers's own examination, and, with one exception, they leave no doubt that the plant is a *Hamelia*. This exception is, that the ovary is figured as bilocular. Owing to the poorness of the material, I have been unable to ascertain definitely if five loculi are present, as typically in the genus; but I find that there are certainly more than two. There is, moreover, a duplicate specimen in the Kew Herbarium bearing the words "*Hamelia*, fide Triana."

H. patens is a shrub which is cultivated extensively in the Old World tropics, particularly in India (Cooke, *Fl. Bombay*, i. 626; Prain, *Bengal Plants*, 563), where, Prain says (*loc. cit.*), it is "often subspontaneous near villages in Central Bengal." The plant collected in Bangkok by Zimmermann (no. 76! Hb. Mus. Brit.), bearing the name *Hamelia ventricosa* Sw., is a form of *H. patens*, interesting on account of its leaves, borne four in a whorl instead of the more usual number, three.

Hab. Florida: *Nash*, 1278! *Rugel*, 311! 312! *Pollard*, 27! *Curtiss*, 1128! 5500! Mexico: *Andrieux*, 329! 330! *Liebmann*, 55! 56! *Gouin*, s. n.! *Sallé*, 502! *Palmer*, 1277! *Jurgensen*, 1! *Bourgeau*, 1607! 2627! *Coulter*, 202! Guatemala: *Salvin & Godman*! *J. D. Smith*, 1974! Yucatan: *Gaumer*! Nicaragua: *Seemann*, 136; *Tate*, 198! *Baker*, 2002! 2478! Costa Rica: *Endress*, 19! *Lehmann*, 1778! *Tonduz*, 11,460! 12,813! *Cooper* ex herb. J. D. Smith, 5790! *Polakowsky*, 142! 241! Honduras, San Carlos, Gulf of Fonseca: *Barclay*, 2664! Panama: *Hinds*! *Hayes*, s. n.! *Cuming*, 1235! Colombia: *Hartweg*, 1054! *Triana*, 138! *Holton*, 439! *Kalbreyer*, 266! 852! *Cuming*, 1235! West Indies, Jamaica: *Macfadyen*! *Marsh*, 636! Porto Rico: *Heller*, 339! *Sintenis*, 65! 2851! Cuba: *Combs*, 29! *Wright*, 227! *Tranqueville*, 310! Bahamas: *Northrop*, 40! Martinique: *Hahn*, 428! Dominica: *Hoskin*, 14! Hispaniola: *Swartz*! Trinidad: *Fl. Trin.* 32!

Venezuela: *Moritz*, 464! *Fendler*, 591! Ecuador: *Spruce*, 6226! *Sinclair*! Peru: *Ule*, 6469! *Spruce*, 4188! *Matthews*, 1498! 3135! Brazil: *Riedel*, 199! 423; *Blanchet*, 4, 101, 1359! *Weir*, 77! *St. Hilaire*! *Glocker*, 148! *Burchell*, 7405! *Regnell*, 132½! *Neuwied*, 84; *Claussen*, 272 A; *Mendonça*, 160; *Schenck*, 3741; *Glaziou*, 706; *Mosen*, 1348, 4170; *Pohl*, 5134; *Sello*, 626, 1229, 1791. Bolivia: *Bang*, 1222! *Bridges*, s. n.! Paraguay: *Hassler*, 5212! 6854! 7773! 10,283! *Fiebrig*, 4260! Hb. Mus. Brit.; Hb. Kew; Hb. Univ. Cambridge.

This species, which has of all the widest distribution, is also so variable that the task of finding constant and critical characters is one of considerable difficulty. Some stress has hitherto been placed upon the number of leaves at each node; and in so far as the distinction lies between the opposite and the whorled arrangement, this seems to be constant for the species respectively concerned. The numbers three or four, however, are rarely constant for any species. In *H. patens* the number three is certainly by far the commonest, and this number appears in previous descriptions; but the 4-nate arrangement is to be found, *e. g.* in the herb. Miller specimen (Hb. Mus. Brit.); in *J. D. Smith*, 1974; in *Fl. Trinitatis*, 32; in *Barclay*, s. n. (Hb. Kew.); in *Spruce*, 6226; in Zimmermann's plant from Siam cited above; and in a specimen cultivated by Henslow in the Cambridge Botanic Garden, and preserved in the University Herbarium.

The 5-verticillate arrangement occurs in the following plants gathered in two widely separated districts:—Costa Rica, *Tonduz*, 12,813; *Cooper*, herb. J. D. Smith, 5790: Honduras, *Barclay*, 2664: Bolivia, *Bang*, 1222. In all the circumstances it seems doubtful whether De Candolle's variety γ *quinifolia* (Prodr. iv. 442), founded upon a plant collected in Mexico by Moçino & Sessé, should be maintained. I have not seen this plant; but those cited above differ from the normal *H. patens* in no way save the number of leaves in a whorl, and this cannot be regarded as a constant feature.

The indumentum of the leaf, moreover, is very variable in extent. In some cases both sides of the leaf have a hairy covering, that of the upper being, however, much less conspicuous than that of the lower side; the ventral surface, indeed, is often glabrescent and even quite glabrous. The dorsal indumentum shows every transition from an almost woolly character to minute pubescence confined largely to the veins. In the former case *H. patens* is nearly linked, apparently, with *H. lanuginosa*, a species which I have had no opportunity to examine. In the forms which approach glabrescence, *H. patens* reveals affinity with the glabrate group (species 14–22), typified in *H. papillosa*, *H. pedicellata*, *H. versicolor*, and *H. viridifolia*. The more sparsely pubescent forms of *H. patens* may be distinguished primarily from the members of this latter group by the presence of pubescence on the veins of the third order, as well as on the median and secondary veins, and, as a general rule, between the veins as well as upon them.

In the inflorescence, *H. patens* displays the characteristic arrangement typical of the genus, and I find no variability in this regard in the direction of the aberrant *H. chrysantha* (*q. v. supra*). The corolla is essentially of the smaller type, and is always tubular, being never appreciably inflated above. The calyx-teeth are of the very short, broad, erect type more usual in the genus; the more conspicuous calyx-lobes of *H. calycosa*, *H. lutea*, *H. axillaris*, *H. xerocarpa*, *H. ovata*, and *H. Rovirosæ* do not appear to be foreshadowed among the forms of *H. patens*.

The following features, then, may be suggested as constant and critical for this species:—Leaves usually three, sometimes more, at each node, pubescent on lower surface, sometimes on the upper also, and generally on the secondary and tertiary veins and in the meshes of the reticulum as well as on the median vein; the calyx has very short erect teeth with broad base; the corolla is tubular, never exceeding 2 cm. in length, and is markedly ventricose at the base; the stamens at their shortest almost reach the corolla-mouth, and sometimes exceed it.

The following appears to be a well-marked variety of *H. patens*; there seems to be no justification, at any rate, for regarding it as a distinct species:—

β AXILLAROIDES, var. nov. Foliis angustis elliptico-oblongis sparse pubescentibus, cymis paucifloris axillaribus plerumque in ramulorum dichotomorum furcis apparentibus.

Hab. Ind. Occ.: *de Ponthieu*! in Hb. Mus. Brit.

This variety bears a superficial resemblance to *H. axillaris*; but it is readily separated therefrom by its ternately whorled pubescent leaves.

27. **H. brachystemon,** sp. nov. Foliis glabriusculis verticillatis, corolla inter minores tubulosa, staminibus corollæ medium vix excedentibus.

Hab. New Grenada, Ocaña: *Schlim*, 547! Hb. Kew.

Frutex (?) ramulis gracilibus glabris subteretibus, foliis ternatim verticillatis ellipticis aliquanto asymmetricis 8–11 cm. × 4–5 cm. acuminatis acutis basi in tenerum petiolum ad 3 cm. longum angustatis supra glaberrimis subtus glabratis cystolithis frequentibus, stipulis triangularibus obtusis ad 3 mm. longis, cymis minute pubescentibus paucifloris, calycis totius 3·5 mm. longi tubo elliptico glabrato lobis latis necnon brevissimis, corollæ tubo glabro 1·5 cm. longo parum ventricoso lobis 1 mm. longis × 2·1 mm. latis obtusis margine sinuato, staminum linearum antheribus 5 mm. filamentis 2 mm. longis 2·8 mm. supra corollæ basin insertis, stylo filiforme stamina subæquante, bacca . . .

This species is unique, among those described in the present paper, in the shortness of the stamens relatively to the corolla-tube, and is recognizable by its slender branchlets and petioles, and somewhat asymmetric leaves.

LOPHOZIA SCHULTZII (NEES) SCHIFFN. VAR. NOV. *LAXA*.

BY W. H. BURRELL, F.L.S.

Cæspitibus densis, caulibus ascendentibus, ad 6 cm. longis, 2–4 mm. latis, radiculosis; foliis non latioribus quam longis; cellulis circa 23 × 27 μ apud marginem apicis, usque ad 50 × 100 μ versus basim mediam; stipulis parvis lanceolatis, ciliatis, ·25–·5 mm. longis, circa ·09 mm. latis; paroicis; foliis perigonialibus transversis et gibbis, in amentulis; calycibus subito in ore contractis, in rostrum prominens productis; foliorum margine antica ad basim non dentata.

In loco uliginoso, Flordon, Norfolk, 25 m. alto legit *W. H. Burrell*, vii. 1909.

This plant was at first assumed to be *Lophozia Mülleri* (Nees) Dumortier, but Mr. W. E. Nicholson was not satisfied about its identity, the areolation being more lax than in the specimens with which he compared it, and in the autumn of 1910 he sent it to Prof. V. Schiffner, of Vienna, who detected the paroicous inflorescence, and placed it as a form of *L. Schultzii*, for which he proposed the varietal name "*laxa*." This determination did not pass unchallenged, and a gathering was sent to Herr Kaalaas, of Christiania, who was good enough to examine it. He agreed that the inflorescence was paroicous, and said that the plant could not be referred to *L. Kaurini*, but must either be considered a form or variety of *L. Schultzii*, or be set up as a proper though "small" species.

L. Schultzii belongs to a polymorphous group of Hepatics having bifid leaves and smooth perianths, which Karl Müller, in Rabenhorst's *Kryptogamen-Flora*, places in a section "Leiocolea," with *L. Mülleri* for the type. *L. Schultzii* is paroicous, with the alternate, succubous, subimbricate, obliquely inserted leaves and aromatic odour, which are more or less common to the group, and is restricted to lowland marshes. The principal characters which distinguish it are the tall erect habit, the inflorescence, and the large deeply segmented amphigastria. Considerable weight is attached by authors to these latter organs; both Schiffner and Müller cite the large, much cut under leaves as a reliable character for distinguishing it from *L. Hornschuchiana*, the species with which, in the barren state, it is most likely to be confused. The perianth is described by Müller as cylindrical or clavate, with the mouth abruptly contracted and slightly beaked. In the *Ottawa Naturalist* for April, 1903, A. W. Evans describes *L. Rutheana* Limpr. (= *L. Schultzii*), from Yukon, as having the perianth gradually narrowed above the middle, not distinctly beaked nor contracted at the mouth.

A tabular comparison of some of the characters of the Norfolk plant with those assigned to the species will show the chief points of agreement and divergence:—

TYPE CHARACTERS.	NORFOLK PLANT.
Plant 3–4 mm. broad.	Some plants reach 4 mm., but 3 mm. is the more general maximum width. Slender growths of 2 mm. width are common.
Leaves broader than long, up to 3 mm. wide at base.	Breadth about equals length; 1·5 to 2 mm. is an average length and breadth.
One to three small teeth frequently occur on the antical margin near insertion.	Antical margin near insertion without teeth.
Leaf-cells 30 μ diam. near margin; 30 × 45 μ near middle of leaf.	At apex the cells average 23 × 37 μ, increasing in size towards middle near insertion to 50 × 100 μ.
Amphigastria very distinct and large, divided to the base in lanceolate ciliated segments.	Amphigastria small and obscured by the radicles, though numerous and easily found when searched for; lanceolate, toothed, and ciliate at base, and here generally about five cells wide.
Male bracts not gibbous (nicht bauchig gehölt).	Male bracts distinctly gibbous, insertion transverse, forming well-defined amentulæ or Ähren.

Bearing in mind the stress laid by authors on the large deeply cut amphigastria as a character of diagnostic value, I have had some difficulty in admitting that the Norfolk plant with these organs so small belongs here; the perianth also offers a difficulty, being conspicuously contracted and beaked at the mouth.

The habitat is the marshy bottom of a small valley in a chalky Boulder Clay area at 80 ft. O.D. A considerable amount of calcium carbonate is precipitated on the marsh floor from water which drains through the valley, and the submerged vegetation shows a white incrustation when dried. Although no other members of the Leiocolea section have been detected in the county, a large quantity of our plant occurs in this station, forming dense spongy tufts over a limited area, where it is associated with such hygrophytes as *Drosera*, *Pinguicula*, *Parnassia*, *Juncus*, *Fissidens adiantoides*, *Hypnum stellatum*, *H. molluscum*, &c. The capsule is normally terminal, and takes two seasons to mature. When fertilization has been effected, elongation of the stem usually ceases until the spores are matured, although an innovation sometimes arises from below a fertile perianth. In a large number of cases the perianths are barren, and new growth proceeds by innovation, stems frequently showing three annual segments, each terminated by a small barren perianth. It follows that the maturing capsules are overtopped by the new growth of the surrounding barren stems, and must be sought at the base of the tufts, where they are somewhat obscured by their brown covering leaves from which chlorophyll has disappeared.

The known distribution of *L. Schultzii* is mainly subarctic; several records exist for North Germany, Denmark, Norway, and Sweden; it has been found near or within the Arctic Circle, at Sarek in Lapland, Yenisei in Siberia, and the Yukon territory in America. At Flordon in Norfolk, 52° 32′ latitude, its first recorded station for the British Islands, it reaches one of its most southerly points, being on practically the same parallel as Neumark and Mohrin in Brandenburg.

I am indebted to Prof. V. Schiffner and Herr Kaalaas for their weighty assistance in determining this very interesting addition to the British Flora, and to Rev. D. Lillie, Messrs. D. A. Jones, S. M. Macvicar, W. E. Nicholson, and A. Wilson for their criticism and the loan of specimens of this species and its allies.

AFRICAN MILLETTIAS.

By S. T. Dunn, B.A., F.L.S.

By the courtesy of the Director of the Royal Botanic Gardens, Kew, the writer has recently been afforded the opportunity not only of studying the rich collections of the genus *Millettia* preserved in the herbarium of that establishment, but of supplementing these with abundant material obtained on loan for him from Berlin and Paris. His thanks are especially due to Dr. Stapf, Dr. Harms, and M. Gagnepain for the friendly assistance that they have given him regarding the collections in the herbaria with which they are respectively connected.

It will probably be a long time before so complete a mass of African *Millettia* material can be brought together again, and as full advantage as possible has been taken of the opportunity thus offered for revising that perplexing genus. It has been particularly fortunate that the types of Bentham's, Hooker's, and Baker's species among the older African collections at Kew, and seldom authentically represented in other herbaria, could be compared with the more recent collections of French and German explorers. Several doubtful points have been elucidated by reference to Welwitsch's beautiful series of types in the Herbarium of the British Museum (facilities for consulting which were kindly given by the Keeper).

It has been necessary to distinguish many new species, specimens of which, bearing manuscript names, will be found in the four herbaria mentioned. Pending the appearance of a more elaborate description and arrangement of all the species, which is now in preparation, it will therefore be convenient to indicate as briefly as possible the relations of these new species with their allies, and the following keys have been constructed with that object:—

Millettia.

Sect. Efulgentes Dunn, sect. nov. Foliola sæpissime stipellata, subtus sæpius adpresse sericea, nitentes; flores subsessiles; calyx dense velutinus; corolla alba, glabra, vexillo auriculato.

Clavis.

- Calycis dentes tubo bis breviores ad bis longiores; foliola subtus efulgentia, sæpius minime stipellata.
  - Foliola coriacea; ramuli dense velutini **coruscans** Dunn, sp. n.
  - Foliola papyracea; ramuli glabrescentes.
    - Flores in nodis conferti .... *Ulbrichiana* Harms.
    - Flores in ramulis floriferis distincti.
      - Foliolorum venæ 4–5-pares ...... **fulgens** Dunn, sp. n.
      - Foliolorum venæ 8-pares vel plures.
        - Bracteolæ calycis tubo bis breviores **lucens** Dunn, sp. n.
        - Bracteolæ tubo 4-plo breviores.
          - Stipellæ conspicuæ............... *hypolampra* Harms.
          - Stipellæ obsoletæ.
            - Paniculi efoliati.
              - Foliola terminalia cuneata subito acuminata .... **Lecomtei** Dunn, sp. n.
              - Foliola terminalia oblongo-lanceolata *Dinklagei* Harms.
            - Paniculi foliosi .... **Klainei** Dunn, sp. n.
- Calycis dentes breves; foliola subtus sæpissime tenuiter sericea vel glabra, conspicue stipellata.
  - Calyx purpureo-sericeus.
    - Foliola caudata .... *bipindensis* Harms.
    - Foliola acuta vel obtuse acuminata.
      - Foliola subtus ferruginea **Scott-Ellioti** Dunn, sp. n.
      - Foliola subtus glabra... **porphyrocalyx** Dunn, sp. n.
  - Calyx brunneo-sericeus.
    - Flores 20 mm. longi; foliola subtus reticulata **aureocalyx** Dunn, sp. n.
    - Flores 12–15 mm. longi; foliolorum venæ primariæ tantum prominentes.
      - Foliola 2–5 cm. longa .... *Warneckii* Harms.
      - Foliola 9–20 cm. longa.
        - Foliola subtus dense sericea.
          - Flores in nodis conferti ... **Tholloni** Dunn, sp. n.
          - Flores in ramulis floriferis distincti **chrysophylla** Dunn, sp. n.
        - Foliola subglabra.
          - Flores in nodis conferti ...... *macroura* Harms.
          - Flores in ramulis floriferis distincti *macrostachya* Dunn, nom. n.[*]

Sect. Compresso-gemmatæ Dunn, sect. nov. Arbores; axillarum gemmæ compressæ, lenticulares; flores speciosi.

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[*] *Lonchocarpus macrostachyus* Hook. f. = *Millettia macrostachya* Dunn.

- Vexillum pilosum brevius quam 25 cm. longum.
  - Foliola ovata.
    - Foliola supra velutina, subtus molliter hirsuta *micans* Taub.
    - Foliola subglabra .... *versicolor* Welw.
  - Foliola oblonga.................................. *caffra* Meissn.
- Vexillum tenuiter sericeum, 30–35 mm. longum **Sacleuxii** Dunn, sp. n.

Millettia Stuhlmanni Taub. and *M. Laurentii* De Wild., with glabrous corollas, also belong to this section.

As Dr. Harms recently pointed out to the writer, the different forms which have usually been referred to *M. ferruginea* Baker and to *M. leucantha* Vatke, respectively, require revision, and after a careful study of the fine series sent back by German collectors from German East Africa, and by British collectors from Uganda, it appears convenient to recognize a small group of shrubby species related to them in the following manner:—

- Frutices erecti; foliola multijuga, stipellata; vexillum sericeum.
  - Pedicelli calyce vix longiores .... *ferruginea* Baker.
  - Pedicelli calyce multo longiores.
    - Flores calyce 2–3-plo longiores.
      - Vexillum oblatum, carina valde falcata **oblata** Dunn, sp. n.
      - Vexillum ovatum, carina haud falcata... **dura** Dunn, sp. n.
    - Flores calyce 4–5-plo longiores ... **leptocarpa** Dunn, sp. n.

- Frutices erecti; foliola paucijuga, stipellata; vexillum pilosum.
  - Paniculi rachis calyxque breviter adpresse sericei **lasiantha** Dunn, sp. n.
  - Paniculi rachis calyxque dense velutini ...... *leucantha* Vatke.

The group of West African climbers, of which *M. Barteri* (Benth. *sub* Lonchocarpus) is the best known example, may be arranged as follows:—

- Foliolorum venæ impressæ.
  - Bracteæ longæ lineares; foliola 4 (–3)-juga, hirsuta; stipellæ nullæ vel minutæ.
    - Foliola subtus molliter ferruginea .... *Soyauxii* Taub.
    - Foliola subtus tenuiter hirsuta ...... **bicolor** Dunn, sp. n.
    - Foliola subtus adpresse sericea **Gagnepaineana** Dunn, sp. n.
  - Bracteæ breves; foliola 3-paria, subglabra.
    - Foliola stipellata.
      - Flores 15 mm. longi; foliola obtusa *Goetziana* Harms.
      - Flores 10 mm. longi; foliola acuminata *impressa* Harms.
    - Foliola exstipellata .... **calabarica** Dunn, sp. n.
- Foliolorum venæ haud impressæ .... *Barteri* Dunn, nom. n.*

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* *Millettia urophylla* Welw. cannot be distinguished from *Lonchocarpus Barteri* Benth., which has priority of publication.

NEW FORMS OF *MERTENSIA* FROM THE FAR EAST.

By H. Takeda.

1. Mertensia maritima Don, subsp. nov. asiatica Takeda. Perennis. Caulis robustus, longe prostratus, plus minus ramosus. crassus, carnosus, glaberrimus, glaucus. Folia carnosa, intense glauca, supra punctato-scabra, subtus glaberrima, radicalia longe-petiolata, obovata, late obovatave, obtusa, plus minus mucronata, caulina ovata obovatave, inferiora mediaque in petiolum alatum decurrentia, superiora sessilia, basin versus attenuata, sparsa. Inflorescentia dichotomo-cymosa, initio densa, demum plus minus elongata, pluriflora, foliosa, basi foliis binis oppositis instructa. Flores magni, longe pedicellati, pedicellis flore longiore, post anthesin nutantibus, inferioribus bracteatis, supremis ebracteatis, bracteis majusculis. Calyx 5 mm. longus, 5-partitus, lobis lineari-lanceolatis mox elongatis, deltoideis, 5–6 mm. longis, glaber. Corolla magna, plus 10 mm. longa, tubo calyce æquanti, limbo dimidio 5-lobo, lobis rotundato-quadrantibus. Stamina anthero 2 mm. longo, filamentis æquanti. Stylus inclusus, 8 mm. longus, staminibus superans. Nuculæ 5 mm. longæ, 3 mm. latæ.

Hab. Kamtschatka (*Beechey*; *Littledale*); Ochotzk (*Turczaninow*); coast of Manchuria (*C. Wilford*, 1859, n. 1090; *Maximowicz*, 1860); Japan (*J. Small*); Yezo (*Maries*); Hakodate (*Albrecht*, 1861; *Maximowicz*, 1861); Mombetsu (*U. Faurie*, 1887, n. 729); Kushiro (*M. Uyeda*); Kuriles; Shakotan (*H. Takeda*, 1909); Eturup (*U. Faurie*, 1890, n. 6793); Saghalien (*Glehn*, 1861).

Planta nostra in littore maritimo regionis subarcticæ Asiæ orientalis copiose crescit a planta typica europæa statura valde robustiore, floribus fructibusque majoribus, stylis calyce duplo staminibusque superantibus, pedicellis fructiferis nutantibus diversa est.

2. Mertensia rivularis DC. var. nova japonica Takeda. Caulis erectus usque ad 4 dm. altus, glaber, supremo hirtellus, ramosus. Folia basilaria plus minus longe petiolata (plerumque 10–20 cm.), late cordato-ovata, acuta acuminatave, 4–8 cm. longa, 3–7 cm. lata, subtus fere glaberrima, supra adpresse pilosula, margine adpresse ciliata, plus minus glauca, caulina inferiora breviter petiolata, superiora sessilia, ovata, acuminata, basi subcordato-rotundata, subtus fere glabra, supra hirtella. Flores longe pedicellati, pedicellis florendi tempore calyce duplo, demum 4-plo longioribus, hirsutis, ebracteatis. Calyx 5-partitus, lobis lineari-lanceolatis, acutiusculis, trinervis, extus glabris, intus margineque pilosis, 4½–6 mm. longis, post anthesin elongatis 7–8 mm. longis. Corolla magna, 15 mm. longa, tubo albo calyce sesquilongiore, limbum cæruleum subæquanti. Stylus filiformis, corolla æquilongus, nec exsertus.

Hab. Yezo; in summitate montis Yubari (*T. Ishikawa*, 1896). Kuriles; in apice montis Shakotanyama, insulæ Shikotan (*H. Takeda*, 1909); Porosu, insulæ Eturup (*T. Kawakami*, 1898), inter Porosu et Tôro, ejusd. ins. (*S. Yokoyama*, 1893), Otoi,

ejusd. ins. (*Y. Tanaka*, 1895), in apice montis prope portum Moikeshi, ejusd. ins. (*T. Ishikawa*, 1890), in montanis inter Naipo et Tôro, ejusd. ins. (*M. Kambe*, 1890); Yoshinohama, ins. Urup (*K. Uchida*, 1891), Suisanwan, ejusd. ins. (*K. Jimbô*, 1891).

Nostra planta differt a typica foliis latioribus, subtus glabris nec pilosis, calyce majore, est plerumque in insulis Kurilis nec non in Yezo distributa.

GLOUCESTERSHIRE RECORDS.

By the Rev. H. J. Riddelsdell.

The preparation of material for the projected Flora of Gloucestershire has called my attention to the unsatisfactory nature of Watson's dividing line. The county is split into two vice-counties, East Gloucester and West Gloucester, under the respective Watsonian numbers 33 and 34.

It is rather strange that there should be any difficulty with the division, for Watson was by no means a stranger to the county. His herbarium records show that he visited it more than once, notably in the early sixties: though there is no evidence, I believe, that he was in any other part of it than the neighbourhood of the Severn, from Tewkesbury down to Bristol.

The difficulty is not that the division is of an arbitrary nature: to some degree, arbitrariness must come in, if it is to be practically useful. But Watson does not appear to have referred either to a large scale map, or to have consulted local botanists on the subject. (The alteration of the county boundaries since his time has made no difference in all this, I believe.) His rule is: "East and West Gloucester are separated by the Thames and Severn Canal, and by the river Severn from the point of junction up to Tewkesbury" (*Top. Bot.* ed. 2, p. xliii.).

Now the Thames and Severn Canal begins by Lechlade, in Gloucestershire, and keeps in the county for a few miles, along a course about east and west. It is never more than about half a mile distant from the Wilts border, and sometimes is within a hundred or two hundred yards of it. About a mile west of Kempsford Church it enters Wilts, and stays there for six or seven miles, though at one point it seems (my evidence is the one inch reduction of the ordnance map) actually to touch the Gloucestershire boundary. It finally re-enters this county some way beyond Cerney Wick, close to "Wildmoorway Bridge" (of the ordnance map). All goes well now till it joins the Severn at Upper Framilode. The division is now marked by the river. But difficulties arise at Gloucester. There the Severn runs in two channels, which convey about equal volumes of water. The question is, Which channel is Watson's line to follow? It is an important matter, for interesting records are at stake. And once again: about a mile above Haw Bridge the river becomes the county boundary. For a mile or so, Worcester county appears on the right bank, but then comes the parish of Forthampton, on the same bank, and this is Gloucestershire; and so it goes on till close to Tewkesbury. Here the Watsonian difficulties cease, for the Severn once again becomes the boundary.

As work at the Flora has made the question one of practical importance, I propose (1) to disregard the Thames and Severn Canal until it enters Gloucestershire near Cerney Wick. Thus, all that part of the county about Lechlade and Kempsford will be in v.-c. 33; it obviously belongs to E. Gloucestershire, and is better there. (2) To take the division along the western channel of the Severn about Gloucester. In Watson's day the traffic ran that way. Now in these latter times the eastern channel has become the chief waterway, as I understand from Mr. A. J. Stephens, of Gloucester. Thus the Hams and Alney Island remain in v.-c. 33. (3) To reckon Forthampton parish in West Gloucester. I would rather it were put to East Gloucester, as it is closely associated with Tewkesbury in record work. But it seems better to deal with Watson's division faithfully.

The following list—very imperfect, but I hope fairly accurate—serves to show several omissions from *Top. Bot.* which are not easy to understand. Publications and other sources of information that are far from obscure seem not to have been quite exhausted. Nowadays so many different publications are used for the record of plants seen—some of them with only a very remote bearing on the subject of topographical botany—that it becomes easier to miss information.

Both Watson and others—including the present writer—have made slips in the assignment of records between the two vice-counties. A locality "Minchinhampton Common above Brimscombe" was authoritatively placed in East Gloucester. I have seen a statement made by a botanist well acquainted with the county that the Gloucester and Berkeley Canal was in v.-c. 34, whereas the canal is cut into two not very unequal lengths by the Thames and Severn Canal; one—and the larger—part is, therefore, in v.-c. 33. Again, a record from a spot between Bath and Bristol was put to v.-c. 33 by Watson. Necessary corrections in such matters are made in the following list.

Dr. G. O. St. Brody, of Gloucester, made a very valuable collection of Gloucestershire plants from 1863 to 1871. The herbarium is now in good order, and safely housed at the Gloucester Museum. References to him in the following list are numerous; for a considerable number of records rest on the authority of his specimens: but there is good reason to accept his *bona fides*.

St. Brody, however, had the disconcerting habit of preserving sheets for species which he only knew of as *reported* from the county; the report being usually traceable to some old publication. He seems, in such cases, to have got specimens elsewhere and put them on his sheets. At least, that appears to me the most probable interpretation of the facts: sometimes, for instance, he mentions a species as "reported" from Gloucestershire, but has no specimen in illustration. I do not believe his language can mean that the specimens were sent by people who had found them and sent him a "report" along with them. Mr. White assents to this treatment of St. Brody's "records": so that some of those given in *Journ. Bot.* 1907, pp. 407–8, as constituting new records for Gloucestershire have to be cancelled.

My own finds are marked with ! Records which do not appear in *Top. Bot.* ed. 2, or Supplement of 1905, are starred. This, however, does not imply that such records are absolutely new; but there is an obvious convenience in using such a well-known standard of reference. For *Rubus*, the standard taken is Rogers's Handbook, together with the supplementary list published in *Journ. Bot.* 1909, pp. 310 and 340. For *Hieracium*, Linton's Handbook is the standard. Plants probably not native are marked with a dagger (†).

Contractions:—Hb. Brody = St. Brody's Herbarium. Hb. Sessions = Sessions' Herbarium, in the Gloucester Museum. Hb. Glos. = Other collections preserved in the Gloucester Museum. Hb. Witts = Herbarium of the Rev. E. F. Witts, kept at Slaughter.

The thanks due to various well-known experts for their obliging help are indicated in the course of the list.

Thalictrum minus L. *33. Crickley Hill, *Hb. Brody & Hb. Br. Mus.* Mr. Linton refers it to var. *odoratum* (Gren. & Godr.). 34. Summit of great quarry facing the Gully, St. Vincent's Rocks, same variety, *Hb. Brody.*—*T. flavum* L. var. *sphærocarpum* (Lej. & Court.). 33. Banks of the Severn! Kempsford!

†*Anemone ranunculoides* L. 33. Haresfield, "near the Vicarage, habitat known for fifty years," *Hb. Brody*, 1868.—†*A. apennina* L. 33. Waste ground, Whitcomb, *Hb. Brody, Hb. Glos.*

†*Adonis annua* L. 33. Specimen from Painswick in *Hb. Brody.*

Ranunculus heterophyllus Weber. "Apparently 33 or 34," *Top. Bot.* Certainly *34, from Shirehampton and Avonmouth (Mr. White's specimens, see *Watson E. C. Rep.* 1900–2, and *Hb. Br. Mus.*). Cerney Wick! "Var. *submersus* (Hiern) we are inclined to think," *H. & J. Groves.* *33. Ponds near Gloucester, *Hb. Brody.*—*R. acris* L. var. *Borœanus* (Jord.). 33. Moreton in Marsh to Todenham; "discovered by F. Townsend" (*W. W. Newbould's* notes).—Var. *rectus* (Jord.). 33. Kempsford! 34. Drybrook! Lydney!

Caltha palustris L. var. *Guerangerii* (Bor.). 33. Aston-sub-Edge, *J. R. Neve.* 34. Broadmoor, near Cinderford! Woodchester, *H. P. Reader.*

†*Eranthis hyemalis* Salisb. 33. Painswick, *Painswick Parish Magazine.* 34. Minchinhampton, *Mrs. Foord-Kelcey.*

Aquilegia vulgaris L. *33. Sheepscombe, *Hb. Glos.*; Frith Wood, *Hb. Brody*; Pitchcombe Wood, *H. P. Reader.* Over a small area of wild, remote down, Bourton Downs, near the top! Barrington Bushes, *Hb. Witts.* Colesborne Forest, *Hb. Trump.* Clearly frequent and native in E. Gloucester.

†*Aconitum Napellus* L. 33. Hucclecote, not native, *Hb. Brody, Hb. Glos.* 34. Wood on May Hill, *Hb. Sessions*; much more likely native, but further investigation is needed.

†*Papaver somniferum* L. 33. Near Gloucester, *Hb. Brody*, var. *hispidum* H. C. Watson. Fields and waste near Upton, *Journ. Bot.* iv. 121. Kempsford! Charlton Kings, *Hb. Trump*; smooth-ped. form. 34. Ryton! Near Newent! Alvington!—†*P. Rhœas* L. var. *Pryorii* Druce. 33. Kempsford! 34. Near Newent!—Var. *strigosum* (Boenn.). 33. Kempsford!—*P. Lecoqii* Lamotte. *34. Arlingham, *E. M. Day*. Cornfields, near Chepstow, *Hb. Brody*. Woodchester, *H. P. Reader*. Newent! But is this a native species?

Glaucium flavum Crantz. 34. Beach, New Passage, *Hb. Brody*. Very abundant there 1910, *E. M. Day*.

†*Corydalis solida* Hook. 33. Roadside near Bibury Court, *J. G. & E. G. Baker*.—*C. claviculata* DC. *34. Walls near Chepstow, 1868, *Hb. Brody*. I have seen an old specimen, dating from the forties, in the herbarium of the Rev. G. W. Sandys, gathered near Stroud (apparently).

Fumaria capreolata L. *33. Fields near Frith Wood, *St. Brody* in *B. E. C. Rep.* 1864. Why was this not included in *Top. Bot.*? It was passed in the Report. There is no specimen of a *Fumaria* from this spot in *Hb. Brody*, and the record cannot be further checked, it seems.—*F. purpurea* Pugsley. *34. Fields near Beachley, and Lancaut, *Hb. Brody*; neither typical, but both named by *H. W. P.*—*F. Borœi* Jord. *33. Waste, near Gloucester, *Hb. Brody*; this is var. *muraliformis* Clav., according to *H. W. P.*—*F. Bastardi* Bor. †33. Garden at Campden! but, I believe, introduced. *34. Lydney, *W. H. Purchas*, in *Hb. Br. Mus.*—*F. officinalis* L. Rampant form at 33, Kempsford! 34. Nailsworth! Bromsberrow!—*F. Vaillantii* Lois. *33. Kempsford! Fields on Leckhampton Hill, *Hb. Brody*. St. Brody records both this and *F. parviflora* Lam. from Leckhampton Hill; but his herbarium shows that *F. Vaillantii* was the plant in both cases. *F. parviflora* must therefore come out of *Top. Bot.*, unless otherwise vouched for.

Radicula N-aquaticum Rendle and Britten var. *siifolia* Druce. 34. Frampton on Severn! Slimbridge *H. P. Reader*.—Var. *microphylla* Druce. 34. Broadmoor.

Barbarea vulgaris Ait. var. *decipiens* Druce. 33. Hailes! and not uncommon. 34. By the River Leadon at Dymock and Upleadon!—*B. stricta* Andrz. 34. Once, by the River Leadon, between Upleadon and the River Ell. The Sharpness record (*Top. Bot. Supp.*) is suspect; it comes from the Docks.—†*B. intermedia* Bor. 33. Ballast heaps, Gloucester, *Hb. Brody*.

†*Arabis alpina* L. 34. Near the White House, one and a half miles from Bristol, going to Kingswood, *Hb. Banks*, 1773. *Hb. Wats.* has a specimen from the same spot, 1837.—†*A. albida* Stev. 33. Walls, Bowbridge, near Stroud!—*A. glabra* Bernh. "33 or 34"? *Top. Bot.* *34 certainly. At Bromsberrow *Lees, Bot. of Malvern Hills*; plenty there, *H. H. Knight*, 1910. Specimen in *Hb. Br. Mus.* 33 probably; waste places near Gloucester, *N. B. G.*; but perhaps not native there.

Cardamine pratensis L. var *dentata* (Schultes.). 34. Lancaut!

—*C. flexuosa* With. *33. Roadside marsh, Stonehouse! Andoversford! Cirencester, *W. J. Greenwood*, spn.!—*C. hirsuta* × *pratensis* (*Hayneana* Welw.). 34. Field at Anwards Farm, Tidenham, 1908! I have cultivated the plant, and found it pretty constant; it spreads freely, not by seeds, but by broken bits of leaves, &c., which take root where they fall. I think the name must stand.

†*Alyssum vindobonense* Beck. 33. Waste ground, Gloucester Docks, *Hb. Brody*. *St. Brody* named it *A. incanum* L.; but I am satisfied that it must go to *A. vindobonense*.—†*A. alyssoides* L. 33 or 34. Fields near Stonehouse, *Hb. Brody*. 34. Fields near Dursley, *St. Brody*, in *Journ. Bot.* iv. 121.—†*A. maritimum* Lam. 33. Waste ground, Gloucester Docks, *Hb. Brody*.

Draba muralis L. 34. Quarry at Henbury, *Hb. Brody*; see *Phytologist* v. 215. Perhaps the character of the locality made Watson suspect the record; but the species occurs in Som. N.

Erophila præcox DC. *33. Bibury, *J. G. & E. G. Baker*. Fairford! Witcombe, *Hb. Glos.*

Cochlearia officinalis L. 34. Shore at Beachley, *Hb. Brody*. St. Brody calls it *anglica*, but wrongly.—*C. danica* L. *34. Sharpness Point, 1864, *Hb. Brody*. *W. A. S.* has it also from the opposite bank at Lydney.

Sisymbrium officinale L. var. *leiocarpum* DC. 34. Arlingham! —†*S. orientale* L. 33. Cheltenham, *Trump*, spn.! Gloucester Docks, *Mrs. Foord-Kelcey*, spn.! Fairford, *J. Taylor*, spn.! Stanway Hill! 34. Lydney!—†*S. pannonicum* Jacq. 33. Gloucester Docks, *Hb. Brody*. Andoversford, *Trump*, spn.! Fairford, *Hb. Br. Mus.*

†*Erysimum orientale* Mill. 33. Gloucester Docks, *Hb. Brody*. Kempsford, *Rev. W. Butt*. 34. Near Tetbury, *Mrs. Griffith*.—†*E. repandum* L. 33. Near the Docks, Gloucester, *Hb. Brody*.—†*E. hieracifolium* L. 33. Llanthony Priory, Gloucester, *K. B. Blackburn*, spn.!

†*Camelina sativa* Crantz. 33. Docks, Gloucester, with var. *fœtida* (Fr.) *Hb. Brody*. 34. Newent! Lydney Canal!—†*C. sylvestris* Wallr. 33. Docks, Gloucester, *Hb. Brody*.

Brassica arvensis O. Kuntze var. *orientalis* (L.). 33. The common form about Ford and Guiting on the top of the Cotswolds!—†*B. Polichii* Sch. & Spenn. 33 or 34. Gravel pit, Stroud, *Hb. Br. Mus.*—†*B. dissecta* Boiss. 33. Docks, Gloucester, *Hb. Brody*.

Diplotaxis tenuifolia DC. 33. Old walls, Campden, *J. R. Neve*, and wall near Cathedral, Gloucester, *Phytologist* iv. 1053.—*D. muralis* DC. var. *Babingtonii* Syme. 33. Gloucester! Cheltenham! Leckhampton Station, *Mrs. Foord-Kelcey*, spn.! 34. Newent! Over! Lydney! Tutshill! Ryeford! Nailsworth, *Mrs. Foord-Kelcey*, spn.!

Coronopus didymus Sm. *33. Kempsford! Duntisbourne Abbots, *Rev. W. Butt*.

Lepidium latifolium L. *34. Westbury on Severn, *Hb. Brody*; and *E. M. Day*! In *Hb. Br. Mus.* is a specimen from Garden

Cliff, Gloucestershire, but I do not know where this locality is.—†*L. sativum* L. 33. Weston-sub-Edge! 33 or 34. Waste, about Stroud, *H. P. Reader*.—*L. heterophyllum* Benth. var. *canescens* Gren. & Godr. *34. And certainly native, among gorse on a sandy heath at Bromsberrow! Lydney! Rocks, Pighole, Tidenham, *Hb. Brody*.—†*L. perfoliatum* L. 33. Cheltenham, *Trump*, spn.! Docks, Gloucester, *Hb. Brody*. Canal, near Gloucester, *K. B. Blackburn*, spn.!—†*L. Draba* L. 33. Maisemore Ham and Sandhurst! Cheltenham! Gloucester Docks! Leckhampton Hill, *Trump*, spn.! 34. Lydney!

Thlaspi perfoliatum L. *34. The Tetbury Road locality, as described in *Journ. Bot.* ix. 17, is partly in this division; verbal descriptions received from observers on the spot support this conclusion. (I have received specimens from v.-c. 34, since writing the above.)

Iberis amara L. *33. Cornfields, Northleach, *Hb. Brody*; perhaps native here. Leckhampton Station, *Mrs. Foord-Kelcey*, spn.! 34. Minchinhampton Common, *H. M. Middleton*, spn.!

Hutchinsia petræa Br. 34. Penmoel cliffs, Tutshill! Coldwell Rocks, *Hb. Watson*.

Cakile maritima Scop. *34. Sand near Beachley, *Hb. Brody*. It occurred as a casual at 33. Kempsford, in a garden.

†*Raphanus sativus* L. 33. Canal bank, Gloucester, *K. B. Blackburn*, spn.!

†*Neslia paniculata* Desv. 33. Docks, Gloucester, *Hb. Brody*.

†*Cleome serrulata* Pursh. 33. Canal side, Gloucester, *K. B. Blackburn*, spn.!

†*Reseda alba* L. 33. Docks, Gloucester, *Hb. Brody*.

Viola odorata L. var. *imberbis* Leight. 34. Highnam, *Hb. Brody*.—Var. *subcarnea* (Jord.). Seems frequent in 33, from Cheltenham to Kempsford! Bibury, *J. G. & E. G. Baker*.—Var. *dumetorum* (Jord.). Bibury, *J. G. & E. G. Baker*. Fairford, *G. C. Druce*.—*V. hirta* L. var. *propera* Gillot. 33. Near Chalford! with var. *inconcinna* Briq.—Var. *Foudrasi* (Jord.). 33. Fairford, *G. C. Druce*.—*V. hirta × odorata* (*V. permixta* Jord.). 33. Birdlip Wood, *Hb. Brody*. Fairford, *G. C. Druce*.—*V. arvensis* Murr. var. *segetalis* (Jord.). 33. Fields, near Gloucester, *Hb. Brody*. Near Ford!

Polygala oxyptera Reichb. *34. Pauntley! Woolaston Chase! Edge End! Milkwall! Gatcombe Wood, *W. M. Rogers*.

Dianthus Armeria L. *33. Field between Cirencester Road and Charlton Common, Cheltenham, *L. Richardson*, spn.! Waste ground on canal, Gloucester, *Hb. Brody*.

†*Saponaria Vaccaria* L. 33. Near Bourton on Hill, quarry, *L. Mott*, spn.! Waste ground, Gloucester, *Hb. Brody*. 34. Sharpness, *Hb. Trump*!

Silene latifolia Rendle & Britten var. *puberula* Jord. 33. On the hills near Cheltenham, *Buckman's Flora of Cheltenham*. Snowshill, on downs! Bourton Downs! 34. Lydney! Nailsworth! Frampton Mansell! Near Tetbury!—*S. maritima* With. *33. Docks, Gloucester, *Hb. Brody*. *34. Rocks by the Wye at

Lancaut!—*S. latifolia* × *maritima*. 33. Almost certainly one of the specimens on St. Brody's sheet of *S. maritima* at Gloucester is this hybrid, which I thought to have found with the type at 34. Lancaut; but this is far less certain.—†*S. dichotoma* Ehrh. 33. Near Guiting hill Farm, in two forms, large and small flowered.—*S. anglica* L. *33. Campden, *J. R. Neve*. *34. Lydney, scarce! —Var. *quinquevulnera* (L.). 33. Brockworth, *Hb. Glos.*: near Docks, Gloucester, *Hb. Brody*.—*S. noctiflora* L. *33. Kempsford! Docks, Gloucester, *Hb. Brody*. *34. Cornfields, Woodchester, *H. P. Reader*.

Lychnis alba × *dioica*. 33. Campden, *J. R. Neve*. Guiting! 34. Lydney! Hewellsfield!

Moenchia erecta Gaertn. Mey. & Schreb. 34. Chase End Hill! Broadmoor! Serridge Green! Probably fairly common in open grassy parts of Forest of Dean.

Stellaria neglecta Weihe. *33. Var. *decipiens* E. S. M. at Haresfield, *Hb. Br. Mus.* 34. Newent, Upleadon, Pauntley, Bromsberrow, frequent!—*S. palustris* Retz. *34. Marsh, near Mitcheldean, 1864, *Hb. Brody*. This is correctly named.

Arenaria tenuifolia L. var. *hybrida* (Vill.). 34. Minchinhampton Common, native!—*A. leptoclados* Guss. Frequent in 33 and 34!—*A. peploides* L. *34. Sand near Beachley, *Hb. Brody*.

Sagina maritima Don. *34. Banks, New Passage, *Hb. Brody*. —*S. ciliata* Fr. *34. Chase End Hill!—*S. nodosa* Fenzl. *34. Sharpness Point, *Hb. Glos.* 1864. Grange Common, *Hb. Brody*, 1864. Minchinhampton Common, glandular form, *W. M. R.* Selsley Hill, *H. P. Reader*. Poole Keynes!

Spergula sativa Boenn. *33. Fields near Birdlip, *Hb. Brody*. *34. Tidenham, *Rev. W. Butt*, spn.!

†*Hypericum hircinum* L. 34. Railway bank, Kemble! — †*H. elatum* Ait. 33. Longridge Wood, *Hb. Glos.*—*H. elodes* L. 34. Broadmoor!

Althæa officinalis L. 34. Marshy meadow, Beachley, *Hb. Wats.* New Passage, ditches, *Hb. Brody*. Near Newnham, spn.!

Malva moschata L. var. *heterophylla* Lej. 34. Sapperton Tunnel! Frampton Mansell!

†*Geranium versicolor* L. 33. Banks, Upton, *Hb. Brody*.—†*G. phæum* L. 33. Whittington, in a ditch!—*G. sylvaticum* L. *33. Near Cranham, *Hb. Brody*; quite possibly native here. — *G. pyrenaicum* Burm. fil. *34. Near Tidenham Station! Various places on Minchinhampton Common!

†*Oxalis corniculata* L. 33. Waste ground near Gloucester, *Hb. Brody*. It is *O. stricta* of ed. ix. of Babington's *Manual*.

†*Impatiens parviflora* DC. 34. Roadside, Nailsworth, *H. M. Middleton*, spn.!

†*Staphylea pinnata* L. 34. Thickets near Beachley, *Hb. Brody*.

Acer campestre L. var. *leiocarpon* Wallr. 33. Guiting Wood!

†*Trigonella Fœnum-græcum* L. 33. Docks, Gloucester, *Hb. Brody*.—†*T. laciniata* L. 33. Near the Canal, Gloucester, *K. B. Blackburn*!

†*Medicago Falcata* L. 33. Near Dockyard, Gloucester, *K. B.*

Blackburn !—*M. lupulina* L. var. *Willdenowii* (Mérat.). 34. Garden, Newent !—†*M. minima* Desr. 33. Clover field, Gloucester, *Hb. Brody*.

Melilotus officinalis Lam. *34. Pauntley ! Fields near Mitcheldean, *Hb. Brody*.—†*M. indica* All. 33. Gloucester Docks, *Mrs. Foord-Kelcey*. 34. Bristol, *Hb. Trump* !

Trifolium pratense L. var. *parviflorum* Bab. 33. Ford ! Snowshill, *J. M. Dixon*, spn. ! 34. Lydney !—*T. striatum* L. 34. A frequent plant of the grassy roadsides and open spaces of the Forest of Dean ! *T. filiforme* L. is even more common there !—†*T. hybridum* L. and var. *elegans* (Savi.). Very common, 33, on the plateau of the Cotswold Hills.—†*T. agrarium* L. 34. Clover crop near Devil's Pulpit, Tidenham, *Hb. Br. Mus.*

Lotus corniculatus L. var. *villosus* Ser. 34. Newent ! Railway bank at Woolaston, *Hb. Br. Mus.*

Astragalus danicus Retz. *34. Rodborough Common, *S. J. Coley*.

Onobrychis viciæfolia Scop. *34. Minchinhampton and neighbourhood, Tetbury, &c. ! No doubt as native as in 33.

(To be continued.)

CARDIGANSHIRE *MUSCINEÆ*.

By the Rev. R. Jackett.

The following hepatics and mosses were gathered on the banks of the Rheidol, the Mynach, and the Turn in August, 1907. The Rheidol rises in Plynlimon, 2460 ft.; below Ponterwyd it flows for three or four miles through a deep rocky ravine, part of which is wooded. The Mynach rises in Llyn Rhyddnant, 2000 ft., and enters the Rheidol below the Devil's Bridge Falls. The Turn has a very short course, and enters the Rheidol through a very deep gorge. The formation is Lower Silurian.

All the species as to which any doubt might arise have been seen and certified as correct by Mr. W. Ingham. Those marked * are new for the county.

Hepatics.

Ricciella fluitans Braun.
Marchantia polymorpha L.
**Preissia commutata* Nees.
Lunularia cruciata Dum.
Metzgeria furcata Raddi.
M. **conjugata* Lindb.
M. hamata Lindb.
M. **furcata* var. *æruginosa* Hook.
Blasia pusilla L.
Pellia calycina var. **lorea* Tayl.
P. epiphylla L.
**Mylia Taylori* Gr. & B.
**Jubula Hutchinsiæ* Dum.
Frullania tamarisci Dum.
F. dilatata Dum.
Radula complanata Dum.
Diplophyllum albicans Dum.
Scapania resupinata Dum.
S. purpurascens Tayl.
S. undulata Dum.
Marsupella emarginata Dum.
Plagiochila asplenioides Dum.
P. spinulosa Dum.
Trichocolea tomentella Dum.
Blepharostoma trichophylla Dum.

Lophocolea bidentata Dum.
Jungermania lycopodioides var. _Flœrkii_ Web. et Mohr.
_J._ *_crenulata_ var. _inundata_ Schp. (the second record for the British Isles).
Nardia hyalina Carr.
N. scalaris Schrad.
*_Aplozia crenulata_ Dum.
A. sphærocarpa Dum.
*_Mesophylla compressa_ Dum.
Saccogyna viticulosa Dum.
Chiloscyphus polyanthos Dum.
*_Bazzania trilobata_ Gr. & B.
*_Anthelia julacea_ Dum.
Conocephalus conicus Dum.

Mosses.

Sphagnum cymbifolium Ehrh.
_S._ *_recurvum_ var. _mucronatum._
S. squarrosum Pers.
S. intermedium Hoffm.
S. cuspidatum Ehrh.
S. acutifolium Ehrh.
Andreæa Rothii Web. et Mohr.
A. alpina Smith.
*_Tetraphis pellucida_ Hedw.
Catharinea undulata Web. et Mohr.
_C._ *_crispa_ James.
Oligotrichum hercynicum Lam.
Polytrichum nanum Neck.
P. aloides Hedw.
P. urnigerum L.
P. piliferum Schreb.
P. juniperinum Willd.
P. formosum Hedw.
P. commune L.
Ceratodon purpureus Brid.
Dicranella varia Schp.
D. heteromalla Schp.
Blindia acuta B. & S.
—var. _trichodes_ Braithw.
Dicranoweisia cirrhata Lindb.
*_Dichodontium pellucidum_ Schp.
Campylopus flexuosus Brid.
_C._ *_Schwartzii_ Schp.
Dicranum Bonjeani De Not.
D. scoparium Hedw.
D. majus Turn.
_D._ *_fuscescens_ Turn.
Leucobryum glaucum Schp.
Fissidens viridulus Wahl.
F. osmundoides Hedw.
F. adiantoides Hedw.
F. bryoides Hedw.
Grimmia pulvinata Smith.
G. maritima Turn.
Grimmia apocarpa Hedw.
G. Doniana Smith.
Rhacomitrium aciculare Brid.
R. protensum Braun.
R. fasciculare Brid.
R. heterostichum Brid.
R. lanuginosum Brid.
R. canescens Brid.
Coscinodon cribrosus Spruce.
Ptychomitrium polyphyllum Fürn.
Hedwigia ciliata Ehrh.
Pottia Heimii Fürn.
P. truncatula Lindb.
P. intermedia Fürn.
Phascum cuspidatum Schreb.
*_Tortula ruralis_ Ehrh.
T. ruraliformis Dixon.
T. subulata Hedw.
T. lævipila Schwaeg.
Barbula fallax Hedw.
B. unguiculata Hedw.
Weisia viridula Hedw.
Trichostomum crispulum Bruch.
T. mutabile Bruch.
T. tenuirostre Lindb.
Cinclidotus Brebissoni Husnot.
C. fontinaloides P. Beauv.
Encalypta streptocarpa Hedw.
E. vulgaris Hedw.
*_Anæctangium compactum_ Schwaeg.
Zygodon Mougeotii B. & S.
Ulota crispa Brid.
U. phyllantha Brid.
Orthotrichum anomalum Hedw.
O. affine Schrad.
Funaria hygrometrica Sibth.
Aulacomnium palustre Schwaeg.
A. androgynum Schwaeg.
*_Bartramia Œderi_ Swartz.

Bartramia ithyphylla Brid.
B. pomiformis Hedw.
Philonotis fontana Brid.
P. calcarea Schp.
Breutelia arcuata Schp.
Webera elongata Schwaeg.
W. nutans Hedw.
Bryum pallens Sw.
B. pseudo-triquetrum Schwaeg.
B. cæspiticium L.
B. capillare L.
B. erythrocarpum Schwaeg.
B. alpinum Huds.
B. argenteum L.
B. roseum Schreb.
Mnium cuspidatum Hedw.
M. rostratum Schrad.
_M._ *_serratum_ Schrad.
M. undulatum L.
M. hornum L.
M. punctatum L.
Fontinalis antipyretica L.
—var. *_gigantea_ Sull.
Cryphæa heteromalla Mohr.
Neckera crispa Hedw.
N. complanata Hedw.
Homalia trichomanoides B. & S.
Pterygophyllum lucens Brid.
Leucodon sciuroides Schwaeg.
Pterogonium gracile Swartz.
*_Antitrichia curtipendula_ Brid.
Heterocladium heteropterum B. & S.
Thuidium tamariscinum B. & S.
Climacium dendroides Web. et Mohr.
Camptothecium sericeum Kindb.
C. lutescens B. & S.
Brachythecium rutabulum B. & S.
B. rivulare B. & S.
B. velutinum B. & S.
B. populeum B. & S.
B. plumosum B. & S.
B. purum Dixon.
Hyocomium flagellare B. & S.
Eurhynchium tenellum Milde.
E. myosuroides Schp.
E. rusciforme Milde.
Plagiothecium elegans Sull.
P. denticulatum B. & S.
P. undulatum B. & S.
Amblystegium serpens B. & S.
Hypnum stellatum Schreb.
_H._ *_exannulatum_ Gümb.
—var. _pinnatum_ forma _gracilescens_ Boul.
—*var. _pinnatum_ forma _acuta_ Boul.
H. cupressiforme L.
—var. _resupinatum_ Schp.
—var. _elatum_ B. & S.
_H._ *_stramineum_ Dicks.
H. ochraceum Turn.
_H._ *_falcatum_ Brid.
H. molluscum Hedw.
H. cuspidatum L.
Hylocomium splendens B. & S.
_H._ *_brevirostre_ B. & S.
H. loreum B. & S.
H. squarrosum B. & S.
H. triquetrum B. & S.

SHORT NOTES.

Deeside Mosses.—During a short stay in South Aberdeen last July, I paid visits to several of the hills and glens in the neighbourhood of Ballater and Braemar. Although it was scarcely expected to extend the known flora of that famous district, a number of mosses were obtained which appear to be additions to the county, and it may be of interest to place them on record.—_Dichodontium flavescens_ Lindb., with markedly squarrose leaves at Corriemulzie.—_Blindia acuta_ var. _trichodes_ Braith., in dense tufts, two inches high at Pannanich, Ballater; though sterile, having the leaf-form and elongated apical areolation of *trichodes.*—*Dicranum scoparium* var. *orthophyllum* Brid., on Carn Liath, Invercauld Forest, also var. *spadiceum* Boul., in Invercauld Forest.—*D. fuscescens* var. *falcifolium* Braith., amongst disintegrated granite on Carn a Mhaim, Ben McDhui; fruiting stems from Corriemulzie exhibit no structural difference from the more usual form, and intermediate stages were not uncommon.—*Fissidens osmundoides* Hedw., by the roadside on the way to Glen Clunie.—A sterile *Grimmia* from Creag Choinnich may be referred to either *G. conferta* Funck., or *G. apocarpa* var. *pumila.*—*Trichostomum tortuosum* var. *fragilifolium* Dixon, near the summit of Creag Choinnich. The arboreal mosses were abundant at Corriemulzie; *Orthotrichum stramineum* Hornsch., was found, and also a smaller species, which is very near or identical with *O. pallens* Bruch.—On a *Philonotis* from Upper Glen Dee I queried *P. cæspitosa*; Mr. Ingham remarks: "This is certainly *P. tomentella* Mldo. emend. Loeske, a recent split from *P. fontana.* It is distinguished from the latter by margin narrowly recurved, by longly excurrent nerve, and especially by its much narrower nerve. I have specimens of *P. tomentella* from Ben McDhui and Killin, so yours is the third gathering I know of. It is quite a *Philonotis* of the mountains of the North."—*Hyocomium flagellare* B. & S., frequent about the Garbh Allt in Ballochbuie Forest.—*Eurhynchium prælongum* var. *Stokesii* Brid., a slender form, Corriemulzie.—*E. Swartzii* Hobk., in the vicinity of Corriemulzie.—*Plagiothecium pulchellum* var. *nitidulum* Husn., fruiting sparingly, on mica schist at Linn of Dee.—*Hypnum exannulatum* var. *pinnatum* Boul., appears widespread in the district. Examples were found in Glen Callater; submerged near the summit of Creag Choinnich, on Lochnagar; and a fine green form at Linn of Quoich.—Var. *falcifolium* Ren., by the junction of Clunie and Callater.—*H. cupressiforme* var. *resupinatum* Schimp, Deeside, Ballater, and near Mar Lodge.—Var. *filiforme* Brid., Corriemulzie.—Var. *ericetorum* B. & S., Glen Quoich.—*H. eugyrium* Schimp., at Corriemulzie. My best thanks are due to Mr. W. Ingham, B.A., who has kindly verified the naming.—EDWARD A. RICHARDS.

SALICORNIA (see p. 177).—The following abstract of the paper read by Dr. Ethel De Fraine, in conjunction with Dr. Moss's observations, at the meeting of the Linnean Society on April 6 was accidentally omitted from our notes of the Society's proceedings. Evidence was brought forward to show that the so-called succulent "cortex" of *Salicornia* is morphologically of foliar nature. This conclusion was based upon the following considerations:—(1) The development of the shoot behind the apex. (2) The anatomy, and the course of the vascular bundles. (3) The structure of the flowering shoot. (4) The mechanism of the leaf-fall. (5) The morphology of the seedling. (6) The morphology of species of allied genera. Phylogenetically, the condition most probable arose by the lateral fusion of the adjacent margins of the broad leaf-bases, and the decurrence down the internode of the leaf-sheath thus produced. A very characterisic feature in the anatomy of many species of *Salicornia* is the occurrence of spiral or spicular cells, or of both. An account of the structure and distribution of these elements was given, and the presence of transitional forms between the two kinds of cells in *S. lignosa* and *S. perennis* was described. The conclusion was arrived at that the spiral and spicular cells are homologous structures, the latter serving for mechanical support, while the former function as water-storing elements. Many species of *Salicornia* have a well-marked aërating cortex, developed from the outer side of the secondary cambium which produces from its inner margin the analogous zone of secondary thickening. This aërating tissue is found at the base of the main stem in *S. fruticosa*, *S. pusilla*, *S. Smithiana*, and *S. gracillima*, and at the base of the aërial shoots or on the rhizome in *S. perennis*, *S. lignosa*, and *S. Oliveri*. A further development of this aërating cortex results in the formation of "ribs" of aërenchyma which are found at the base of the main stem in *S. ramosissima*, while a soft, spongy coating of this tissue occurs in a similar position on the stem and also on the root in *S. europæa*.

Saxifraga Hirculus at Knutsford.—The following incident connected with this plant, recorded in the Rev. Henry Green's *History of Knutsford*, may be worth extracting: "There was on the moor a very rare plant, to be found only in three or four places in the whole kingdom; it is the Marsh Saxifrage, and it grew on a very swampy part of the moor, on a plot of ground which did not exceed fifty square yards. The Count D'Artois (afterwards Charles X. of France) had a rage for rare plants, and his floral passion was known to a French dancing-master then resident in Knutsford—Rogier was his name. The Professor waited on the Count, and together they set out exploring—ditch after ditch they successfully crossed—when lo! one wide and deep, with the peculiarly unctuous mire of the locality, arrested their eager progress; Rogier, being light and a dancing-master, skilfully pirouetted across the abyss; but the Count, being heavy and not a dancing-master, floundered in, and, like a second Falstaff, having an alacrity at sinking, experienced no little trouble to get again on firm ground."

Limonium bellidifolium: a Correction.—In my paper on the Denbighshire Flora (Supp. p. 33) I have recorded *Limonium bellidifolium* for that county. This is an error due to confusion of synonymy. All these records must be read as referring to *L. vulgare*. This error is due to some old records of "*Statice reticulata*" which should be referred to *L. vulgare* and not to *L. bellidifolium*, although according to Hooker (*Student's Flora*) *S. reticulata* L. is given with some doubt as a synonym of *S. bellidifolia*.—A. A. Dallman.

Vicia sylvatica L. var. condensata.—This variety, which I originally described (*Naturalist*, 85, 1884) from plants gathered on the shingle near Port William in Wigton, I found in 1909 in large quantity near Drummore, Mull of Galloway, and distributed it through the Botanical Exchange Club for that year. One of the critics considered it to be only a starved state. The condition of the plant did not suggest starvation, but it was on the shingle, in full sun and partial wind exposure, factors which would naturally make it more compact. I sowed seeds in garden loam, which germinated last year, and have this year flowered. The plants retain their small size, with the glaucescent leaves, of a thicker texture than the type, and more roundly elliptic, shape unaltered; the flowers, too, are in very short racemes and of a darker colour than those of the type. I am surprised to see that the plant so strongly reproduces its distinguishing characters. The cliff plants from Forfar, &c., belong to the type.—G. Claridge Druce.

Euphorbia Lathyrus L.—This was first recorded as a native plant by Dr. Beeke in the *Botanists' Guide* (1805), from Afton in Berkshire. Subsequently Irvine found it in Northamptonshire (*London Flora*, 1838), "far from dwellings and cultivated ground," and I have seen it almost certainly native in that county in Wallesley Wood. It has also strong claims to be considered native in Somerset and Hereford. To those counties may be added Huntingdonshire, where it is spread over a wide area in very large quantities in the woodland area known as Monk's Wood.—G. Claridge Druce.

Montia verna Necker.—Early in May this year I gathered this plant at Burton Point, in the Wirral Peninsula, Cheshire. It was growing on the sandstone close to the shore, associated with *Cerastium tetrandrum* Curt., and indicates a rather unexpected and interesting northern extension in the distribution of this species, which has, I believe, hitherto only been recorded for the southern counties of England. Mr. Druce, to whom I submitted specimens, agreed with me that the seeds were those of typical *verna*.—Wm. Hodge.

Æcidium leucospermum DC. in North Wales. — As Dr. Plowright (*British Uredineæ*, p. 270) remarks that this species is rare in Britain, I think it may be of interest to place on record its occurrence on leaves of *Anemone nemorosa* at the end of April in Nant-y-belan, at the extreme south-east corner of Denbighshire. I was unable to find among the same plants any trace of *Puccinia fusca*, with which the *Æcidium* in question has been connected by Continental authors, but there was growing among the *Anemone* abundance of *Adoxa Moschatellina*, strongly attacked by the *Puccinia* specially attached to that species.—John W. Ellis.

Plantago lanceolata L. var. sphærostachya.—A plant of this, which I brought back from Jersey last year, retained its short spike during the year, but has this year developed spikes indistinguishable from the type, as Dillenius says it did in the Eltham Garden. (See *Dill. Herb.* 97).—G. Claridge Druce.

Tolypella intricata Leonh.—This erratic species has once more reappeared in the ditches at Marston, Oxon. It was first found by me there in 1889, again in 1897, and now in 1911. In each case the ditches or pond· had been cleared from other vegetation in the autumn.—G. Claridge Druce.

REVIEWS.

A Dictionary of Plant-Names. By H. L. Gerth van Wijk; Teacher at the Hoogere Burger-school and at the Gymnasium at Middelburg, Prov. Zealand, the Netherlands. Published by the Dutch Society of Sciences. 2 vols. large 4to, pp. xxiv, 1444. Haarlem, 1909, 1910.

In these two handsome volumes we have the first part of an undertaking which has already involved much time—the editor began to compile it "about twenty-five" (now twenty-seven) years ago—and labour, and which, before the second part is completed, will need an equal expenditure of trouble, and probably even greater expense. Its object is to bring together the names by which a given plant is known in English, French, German, and Dutch; in the two volumes before us all are alphabetically arranged under the Latin names; in the two yet to be produced, the popular names will form the index, each followed by its Latin equivalent, thus reversing the arrangement adopted in Messrs. Britten & Holland's *Dictionary of English Plant-Names.* Besides the names of the plants themselves, the Dictionary includes the parts "now or formally (*sic*) used in medecine" (*sic*)—the editor would have done well to ask some English friend to read his proofs—and names which, "without being used by the people at large, are frequently met with in books: the editor, however, has not inserted all the book-names found by him," and in this we think he is wise: the ridiculously miscalled "English names" which disfigure so many popular books are thus for the most part excluded. Even as it is, however, mere translations are far too numerous.

The popular plant-nomenclature for the four nations specified is very extensive—such lists are practically never complete. The English vernacular names are for the most part taken bodily from the Dictionary already mentioned; those for France are apparently similarly transferred from M. Rolland's *Flore Populaire.* It would, we think, have been only right to state this in the preface; as it is, the Dictionary of English names appears at first sight to be omitted even from the "list of works mentioned by the editor"; it is only on looking this through that we find the work entered under the abbreviation "Epln." This bibliographical list is the most unsatisfactory feature of the book, as the authors' names, in very many cases besides the above, do not appear except *after* the abbreviation, which are moreover often anything but suggestive, *e. g.*:

> "H. gram.: H. C. van Hall, Specimen botanicum, exhibens sinopsin graminum indigenarum."

It is hardly too much to say that the bibliography, which should be one of the most useful features of a book of this kind, is in the work before us practically useless.

To return to the English names, with which we are naturally chiefly concerned, it is unfortunate that the compiler was not acquainted with the *English Dialect Dictionary*, in which will be found many not included in his list. Our colonial floras would have increased his knowledge of Australian and New Zealand names, and he does not seem to know of the long list appended to Grisebach's *Flora of the British West Indies*. On the other hand he occasionally quotes, from Ulrich's *Internationales Wörterbuch der Pflanzennamen*, "English" names which, not appearing elsewhere, seem to be based on some misreading or misapprehension; and sometimes makes suggestions which a more intimate knowledge than he could be expected to have would show to be unnecessary—*e. g.* "Crossflower (Epln. 525) in my opinion a misprint for crow-flower" is a perfectly reasonable suggestion for one who is not acquainted with the legend which regards the spots on the leaves of the plant as a consequence of its growth at the foot of the Cross: he may rest assured that "misprints" are very few in, although not altogether absent from, "Epln." It would probably have been difficult to indicate the source from which each name is derived, though it may be intended to do this in the second part; as it is, one has no means of judging whether or no the source is such as to command confidence.

Considering the typographical difficulties attendant on such a work and notwithstanding the long list of errata prefixed to each volume, we think Herr Gerth van Wijk is to be congratulated on the accuracy with which the names—the English ones at least; we cannot judge as to the rest—have been printed. The writer of this notice may claim to know something of the trouble which a book of this kind, even on a much smaller scale, involves; and he congratulates the compiler on his successful achievement.

Plant-Life on Land, considered in some of its Biological Aspects. By F. O. Bower, Sc.D., F.R.S., Regius Professor of Botany in the University of Glasgow. Cambridge University Press. 1911. Pp. 172. Price 1*s.*

The object of the Cambridge Manuals of Science and Literature, to which series this little volume belongs, is to place within the reach of ordinary readers authentic information as to the views entertained on good authority concerning recent scientific discoveries or the tendency of modern thought.

In the present instance, Professor Bower aims at conveying such information to those who take an intelligent interest in plant-life, as may enable them to appreciate the conclusions arrived at by specialists in the various departments to which it becomes more and more necessary for these severally to devote their attention, and more particularly in regard to the great central problem, still far from ultimate solution—namely, how the vegetable organisms now existing came to be such as they are, and in the surroundings in which we find them.

He starts with the Marine Algæ, which he believes to have been the earliest form of plant-life on earth, and proceeds to trace the course which development appears to have followed in the evolution, first of such terrestrial growths as Ferns and other higher Cryptogams, and subsequently of Flowering Plants, with a discussion of the mode in which flowers themselves came to be produced.

In a series of seemingly disjointed essays, such subjects are treated as the character of plant-population in various situations; the genesis of sand-dunes; and the physical features which make the seaside the original and favourite home of golf-links: the general theme linking them together being the transition of plant-life from water to land.

The reader must not expect to find the book easy reading, for it will demand constant and close attention to master the mass of information with which it is tightly packed. He will, however, have the satisfaction of feeling sure that he has the means of acquiring a large amount of knowledge which is truly scientific.

John Gerard.

BOOKNOTES, NEWS, &c.

At the meeting of the Linnean Society on May 4th, a paper, illustrated by lantern-slides, was read by Dr. F. E. Fritsch, on the Freshwater Algæ collected in the South Orkneys by Mr. R. N. Rudmose Brown. Comparison was made between the algal floras of the South Orkneys and South Georgia, and special attention was directed to the constituents of the "Yellow Snow." Prof. Dendy referred to his method of keeping *Hæmatococcus* in a dried state, and the ease with which it was recalled to activity by being moistened with rain-water and exposed to sunlight; also the fact that the addition of a small amount of nitrogenous matter, such as dead flies, was sufficient to turn the red alga a vivid chlorophyll-green.

The Introduction to Vegetable Physiology, by Prof. J. Reynolds Green, which we noticed at length on its first appearance (Journ. Bot. 1890, 446) has passed into a third edition (J. & A. Churchill, 10s. 6d. net). It has been thoroughly revised—condensed in some parts, extended in others, and in part re-written—and thus merits, even more than it did on its first appearance, commendation as a valuable addition to the teaching literature of botany. Prof. Green, as he tells us in his preface, has set [himself] throughout to combat an idea that has arisen during the last few years that many changes may go on in protoplasm without involving any interchange with its substance. This he holds to be erroneous; "in all the reactions of which it is the scene its own auto-decomposition and reconstruction are involved."

If we do not quite see the *raison d'être* of Miss M. Wrigley's *Studies of Trees and Flowers* (Methuen), that need not prevent us from saying that she has given us a very interesting collection of 129 plates, taken from photographs, of British plants, including a few commonly cultivated in gardens. We are convinced that in time the superiority of drawings which do not represent a specimen so much as a species will again assert itself; but at present reproductions such as Miss Wrigley's are in vogue, and hers are as good as if not better than any that we have seen. The studies of trees—of the Beech in particular—are exceedingly good, and we would gladly have spared some of the smaller plants, which are less characteristic, for more of this kind; of these latter, the specimens are not always well selected—e. g. *Cotyledon Umbilicus* and *Spiræa Ulmaria*, neither of which has any foliage. Miss Lorrain Smith gives a short description of each plate. The volume is a handsome small quarto, and costs 15s. net.

The Herb Garden, by Frances A. Bardswell, with coloured illustrations by the Hon. Florence Amherst and Isabelle Forrest (A. & C. Black, 7s. 6d.), is an attractive guide to the making of a border or bed for herbs, which has now become a feature in large gardens. The book wins an approval by its simplicity and unpretentiousness as well as by its general accuracy; Mrs. Bardswell writes well and with knowledge, and has avoided doing what has been done before—sometimes well, as by Lady Rosalind Northcote in her *Book of Herbs*, but more often badly; so that her book has a character not always to be met with in volumes of the kind. The illustrations are pretty and fairly good in their way; we prefer Miss Forrest's studies of single plants to Miss Amherst's general effects—some of the former, notably the Horse Mint, are distinctly good.

Messrs. Duckworth have just published (price 7s. 6d. net) a handsome and comprehensive volume on *Cacao, its Cultivation and Curing*, by the late J. H. Hart, whose death we announced on p. 176. Although mainly of commercial interest, the botanical history of *Theobroma Cacao* is dealt with, and the other species of the genus are briefly considered; the diseases, vegetable and others, are fully treated, as are the various matters connected with the growth of the trees and the preparation of cocoa. There are numerous illustrations and an excellent index.

Prof. Saccardo is to be congratulated on the completion of his *magnum opus* (in every sense of the phrase), the *Sylloge Fungorum*, by the issue of the conclusion of the *Index Iconum Fungorum*, compiled under his direction by Dr. G. B. Travers. This second volume (M–Z) contains 1310 pages, 120 of which are devoted to a supplement to the whole Index. The work is not one which lends itself to a detailed review; it may be described in one word as being indispensable to every comprehensive student of fungi. The price—82 francs—will not seem high if the nature of the work and its limited public be taken into consideration. Our only regret is that it was not printed on thinner paper.

The second number (dated Ap. 7, but only recently to hand) of the *Journal of Genetics* yields in no way to the first, which we noticed on p. 40, in interest. More than half of it is occupied by an account of Mr. R. P. Gregory's experiments with *Primula sinensis*, undertaken by himself and Mr. Bateson, of which some account has already been published. The present paper deals with the inheritance of heterostylism and of colour, especially the latter, which is illustrated by three excellent plates (two of them coloured) from what are evidently accurately described as "the beautiful and accurate water-colour drawings of Miss M. Wheldale, of Newnham College." The question of colour is discussed with regard to the stem as well as the flower. Miss Wheldale herself contributes an important paper on the formation of Anthocyanin, the ultimate object of the inquiry being the identification of the Mendelian factors for colour. The *Journal*, which is beautifully printed by the Cambridge University Press, costs ten shillings net; the subscription for four numbers is thirty shillings.

The Twenty-first Report of the Missouri Botanical Garden is largely occupied with papers relating to cryptogams. Miss Ada Hayden writes on the Algal Flora of the Garden; Mr. Perley Spaulding on *Botrytis* on Chrysanthemums and Poinsettias and on the fungi of clay mines; Mr. C. H. Danforth on periodicity in *Spirogyra*; and Mr. E. G. Arzberger on the fungous root tubercles of various trees. Mr. David Griffiths continues his useful studies on *Opuntia*, of which he describes and figures several new species; Mr. R. R. Gates writes on abnormalities in *Œnothera*; and Mr. F. E. Lloyd contributes the longest paper in the volume, on the development and nutrition of the embryo, seed, and carpel in *Phœnix dactylifera*.

The Lloyd Library of Cincinnati issued in April as one of its "Bibliographical Contributions" a "Bibliography relating to the Floras of Europe in General and the Floras of Great Britain." The second part of the subject is very fully treated, and the list forms a useful foundation for that more complete enumeration which we had always hoped to persuade the late W. A. Clarke to undertake. It is very well and correctly printed, arranged under the authors' names; to these we regret that the dates of birth and death, in most cases easily ascertainable, are not attached, in accordance with the useful custom which is now prevalent in lists of the kind.

The Education Department of Wellington, New Zealand, has reprinted in a neat little volume entitled *New Zealand Plants and their Story* some papers contributed to periodicals by Dr. L. Cockayne. They are informing and pleasantly written, but their chief interest lies in the 71 illustrations, taken from photographs, showing aspects of the vegetation of the forests, meadows, coast, &c., as well as individual plants. The book is well calculated to foster a taste for botany among youthful New Zealanders.

A handsome catalogue of the Botanic Garden at Buenos Aires comes to us from Senhor Carlos Thays, its founder and director. It is well printed and fully illustrated with views of the Garden and pictures of special plants contained therein.

HARRY BOLUS

(1834–1910).

The name of Harry Bolus will always be inseparably connected with South African botany, and in his death that country which he was wont to call his "very good and kind stepmother" mourns one of the truest-hearted, most ardent, and ablest of her sons—one whose whole life was characterized by an untiring search after truth and a patient industry in finishing well what he had undertaken to do.

Born at Nottingham in 1834, it was in 1850 that, apprenticed to a merchant, he arrived at the Cape, a poor boy with only fifty shillings in his pocket, but with plenty of health and spirits, and a fairly good education for those times. Soon after his arrival one of the fearful Kafir wars broke out, and he was among the Grahamstown volunteers who went to the front in those terrible days.

Bolus began the study of botany in 1864, on the death of his first child, hoping it would prove a means of alleviating his grief. It was at this time that he first corresponded with Sir J. D. Hooker, whose kindly sympathy, encouragement, and help meant much to him during the whole of his life. In those early years he collected vigorously in the neighbourhood of Graaff Reinet (where he lived for fifteen years), Murraysburg, and Somerset East, scaling the highest mountains in search of their floral treasures, scarcely knowing what fatigue meant, and returning home to make careful drawings and descriptions of his interesting finds. He soon made the acquaintance of the late Dr. MacOwan, who was at that time teaching in Somerset East, and a few years later began the friendship with Professor Guthrie, which continued on terms of the closest intimacy until the latter's death in 1899. He always looked back upon the life at Graaff Reinet with great affection. His work there was of a varied character; he was Secretary to an Insurance and Trust Company, writing for and actually printing the *Graaff Reinet Herald*, and at one period farming and counting the sheep as they left their kraals in the morning and returned in the evening. There, too, he was fortunate enough to find himself among musical friends, with whom he could share his love of that art, the singing of the old glees and madrigals affording him pleasure to the last.

In 1874 he came to Cape Town to join his brother as a broker. The work was at first most distasteful and difficult, but its very difficulties called out the fighting spirit in him, and he fought hard until he completely overcame. Twenty years later, having saved sufficient for his own and the wants of all those in any way dependent upon him, he retired from business, and was able to devote more time to his favourite study.

The delight of Bolus at the rich flora of the Western Province was unbounded, and he became specially interested in Orchids.

The first fruit of this attachment was the *Orchids of the Cape Peninsula*, containing thirty-six plates, published in 1888. Then followed the first volume of the *Icones Orchidearum Austro-Africanorum*, in two parts, published in 1893 and 1896, and the second volume of the same work, published in 1911, the whole comprising two hundred plates and descriptions made from living plants sent from all parts of South Africa. His monograph of the genus *Erica* for the *Flora Capensis*, in which he was assisted by Professor Guthrie, was finished in 1903. This was followed by a *List of the Flowering Plants and Ferns of the Cape Peninsula*, in conjunction with Major Wolley-Dod. He devoted a great deal of time to the study of the geographical distribution of plants in South Africa, and published two sketches on the subject—one in 1886, together with a map of the botanical regions, and the other in 1905 for "Science in South Africa," commemorating the visit of the British Association. It was in this connection that he translated the *Zwei Pflanzengeographische Documente* of Ernst Meyer. In collaboration with Dr. MacOwan he prepared, under the name of the *Herbarium Normale Austro-Africanum*, a large number of sets for distribution to all the principal European herbaria.

His more important botanical journeys in South Africa included all the coast regions to Nama'land Minor on the west and Delagoa Bay on the east, various parts of the Transvaal as far north as the Houtbosch, Swazieland, Orange Free State with the slopes of the Drakensbergen, and most of the rich botanical areas in the Cape Colony.

In the year 1873 Bolus became a Fellow of the Linnean Society, and he was one of the original members of the South African Philosophical Society, now the Royal Society of South Africa. Eight years ago the University of the Cape of Good Hope conferred upon him the honorary degree of Doctor of Science, and in 1909 he was awarded the bronze medal and a grant of £50—a graceful tribute instituted by the members of the British Association in commemoration of their visit to South Africa, and annually presented to the chosen scientific men of that country. He made frequent visits to England, working up his plants at Kew, and consulting the National Herbarium. He also travelled in France, Switzerland, Italy, and Greece, and the numerous pencil and water-colour sketches he has made bear testimony to the eager enjoyment he derived from his journeyings.

During all this time Bolus was slowly but surely building up his own herbarium, encouraging students and collectors from all quarters with practical as well as sympathetic help, and inspiring young people to make a beginning, for, he said, a love of Natural History could not fail to be a source of keen delight to them. He was able to secure for his botanical library many valuable works which would now be unprocurable. These include the large folios of Redouté, Jacquin, Bauer, Andrews, Masson, and others; also a complete set of the *Botanical Magazine*, *Botanical Register*, *Refugium Botanicum*, with other old works, as well as most of the modern literature bearing in any way on South African botany.

These, with his herbarium of some thirty to forty thousand mounted sheets, with an endowment for its maintenance and continuance, he has bequeathed to the South African College, where he had in 1903 been the means of founding the Chair of Botany, so ably held by Dr. H. H. W. Pearson. To the same College he has left £48,000 for various scholarships, and eventually his landed property, with an additional considerable bequest.

It was in September, 1908, at the close of the period of the great financial distress caused by the Boer War, that, under the strain of his anxious duties as Director of two Insurance and Trust Companies, Trustee of the South African Museum, South African Library, and of the South African College, Bolus's health gave way, and he was forced for a month or two to relinquish almost everything. With undaunted courage, however, even after his illness, he resumed most of his offices, working, although with ever-increasing difficulty, right up to the evening before his death, when he corrected the final proofs of the last pages of his book.

No account of Dr. Bolus would be complete without some mention of his keen delight and good taste in literature, and especially of his deep love for poetry. From his early boyhood he had learnt it by heart, and he continued to do so to a remarkable degree, so that he was able when out walking to repeat poem after poem, sonnet after sonnet, kindling the warmest enthusiasm in the hearts of his friends. To him may be applied in their fullest meaning the words: "Like the fabled fountain of the Azores, but with a more various power, the magic of Poetry can confer on each period of life its appropriate blessing: on early years experience, on maturity calm, on age youthfulness."

L. K.

WAYFARING NOTES IN RHODESIA.*

By R. F. Rand, M.D., F.L.S.

(Continued from Journ. Bot. 1909, 134.)

ACANTHACEÆ.

Acanthaceæ are well represented in Rhodesia; the following notes refer to those collected by the writer in the immediate neighbourhood of Salisbury.

Justicia protracta T. And. (no. 1380). Posteriorly the corolla is inflected forwards around either side of the style, enclosing it in a tube. This tube is split in front, for the two inflected portions do not unite. From the upper end of the tube thus formed, the style projects, the stigma impinging against the sulcus between the posterior faces of the anthers. As dehiscence is forwards the stigma is shielded from auto-pollination, and, the flower being strongly protandrous, after the withering of the anthers and their withdrawal within the flower by the recoiling filaments, it occupies the site previously held by the anthers.

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* The specimens referred to by numbers are in the National Herbarium.

The two anthers, set side by side, are pressed closely together by the bowed and spring-like filaments. At the lower end of the under-loculus is the horn, or trigger, which, when struck, prompts the discharge of pollen upon the back of a visiting insect. There are a few hairs upon the posterior surface of the anthers, but there are none upon the anterior face, the pollen is thus shot forth in an uninterrupted course.

The stigma, magnified thirty times, is seen to consist of two egg-shaped lobes set antero-posteriorly in the cupule-like termination of the style. The tube occupied by the style appears as a ridge upon the external face of the posterior corolla-wall.

Thunbergia Randii S. Moore (no. 1381). A primrose-coloured flower, the tube of a brighter yellow within, shade-seeking and fading in a day. The two bracts cohere slightly posteriorly, the flower emerging in front. Andrœcium and gynœcium are placed deeply within the corolla-tube. As to the four didynamous stamens: each bears bearded anthers, whose loculi dehisce along the ventral face, after the manner of a pea-pod. The connective is prolonged above into a short horn. The anthers swing easily upon the tips of the filaments, as if loosely jointed. In the two long stamens, long hairs line the edges of the valves of dehiscence in the outer anther-loculi; the inner loculi have a tuft of hairs at their lower ends only. In the two short stamens there are but a few short hairs lining the valves of both inner and outer loculi; the long ones are congregated in tufts at their lower ends. Partly concealed by the hairs of the beard, each loculus bears at its lower extremity a tusk-like process, sometimes a pair, each tusk having at its end two sharp spikes, which project like the "horns" of a snail. A magnification of thirty diameters brings out this last feature more clearly.

The long stamens, anterior in their origin, are bowed outwards, and their anthers clasp the style just beneath the stigma. The filaments of the short stamens are nearly straight, their anthers flank the style, and are ranged immediately below the pair pertaining to the long stamens. All the filaments carry a tuft of hairs at their points of origin from the corolla. Dehiscence is early, and takes place before the flower opens. The sharp processes with which the loculi are armed very probably stick into the bodies of visiting insects, ensuring a good shaking of the anthers as the insect frees itself from their snare.

The corolla-tube is pinched up along the middle line posteriorly. Viewed from the outside this constitutes a low ridge in the length of the tube; seen from the inside it appears as a recessed portion of the tube. In this recess, style and stigma lie. Compare the tubal recess in *Justicia protracta*, above.

The stigma is elaborate. The anterior or lower lip, spreading horizontally forwards, resembles the splash-bowl of a drinking-fountain. The posterior or upper lip is erect, with a lower narrowed portion, whose edges are folded in in front, almost meeting in the middle line, and an upper portion whose extremity is trumpet-mouthed, the opening being in the shape of a trefoil. This upper portion leans forward over the lower lip. The outlines of the posterior lip of the stigma conform to the recessed portion of the corolla-tube. The edges of both upper and lower lips are covered with minute, pointed papillæ. They are swollen, and constitute the stigmatic surface proper.

THUNBERGIA LANCIFOLIA T. And. Long past upon the open veld, it lingers still (Dec. 22nd) upon the upper slopes of the kopje. It is erect in habit, with large velvety, purple flowers, the corolla-tube being of a bright yellow within. The four stamens are only very slightly didynamous. Standing in pairs upon either side of the style their anthers are ranged two and two beneath the stigma. The two inner stamens, posterior in their origin, are slightly below the level of the two outer. The anthers are horned above and bearded below. The horns project posteriorly, a pair upon each side, and upon them, as upon a crutch, the lateral ear-like portions of the stigma lean. In the external stamens each anther possesses two hood-shaped loculi. Dehiscence is pod-like, occurring along the ventral face; the hairs of the beard, collective in function, being mostly grouped in tufts at the lower ends of the loculi. In addition, the external loculus has at the lower end and upon the outer side a process like a cock's spur. This spur is turned horizontally inwards, and has a sharp needle-like point. It probably sticks into the bodies of insects, who shake the anthers in their efforts to get free. The hairs of the beard are long and irregularly nodular.

The anthers of the inner stamens resemble those of the outer, but there is no spur. In the bud, style and stigma occupy a recess in the posterior wall of the corolla; but in the opened flower the stigma leans well forward out of the recess. Externally the recess shows as a vertical ridge. The style is bowed forwards and dilated at its summit into a compressed, trumpet-mouthed stigma. The compression forms a small anterior lip, which is folded inwards, and a much larger saddle-shaped, posterior lip. The parts corresponding to the flaps of the saddle form ear-like projections upon either side. These ears rest upon the horns of the anthers, so that style, stigma, and stamens form a structure lightly locked together. Depending from the outer surface of the ears is a wisp of long, jointed hairs, which trails over the anther-horns. The wisps appear to be fixative in function. The part of the posterior lip corresponding to the pommel of the saddle conforms to the shape of the posterior corolla-wall. Internally the trumpet-mouth is smooth, but the outer surface is studded with short glandular hairs in grouped patches. The edge of the posterior lip and the outer part of the edge of the anterior lip are thickened, and constitute the true stigmatic surface. An entering insect first encounters the stigma, which obstructs the path. On touching it, the whole stamino-stylar fabric is jolted, and this will tend to shake the pollen out upon the beard, which, in turn, transfers it to the insect as it brushes past; but probably a more effective agent in this respect is the sharp spur upon the external loculus, as noted above. As the insect pushes past, in its exit, the stigma falls back into the recessed portion of the tube.

Ruellia patula Jacq. (no. 1382) is remarkable for the fugaciousness of its flowers. The buds of the evening open early upon the morning of the day following. By noon the flowers have fallen. Upon a cloudy day or in deep shade their lives may be prolonged for several hours. The corolla is delicate in texture, veined, and of purplish-blue tint, the colour fading rapidly. There are four didynamous stamens, with simple unbearded anthers, hastate in shape as the two loculi diverge below. A rudimentary fifth stamen is often present. The style is long and slender; the stigma, at maturity, at a slightly higher level than the upper pair of anthers. The posterior stigmatic lip is rudimentary; the anterior is spathulate, arching forwards. Its upper surface is covered with irregular papillæ, these in turn being beset with minute secondary papillæ; the whole constituting a highly receptive surface. It is the first thing encountered by a visiting insect, which, upon its retreat, pushes it back against the posterior corolla-wall. The sulcus in the posterior corolla-wall noted in the preceding examples is not pronounced; it is noticeable, however, in the lower part of the tube showing a slight elbow just above the point at which the infundibuliform dilatation of the corolla commences. Style and stigma do not fall with the corolla and stamens. Auto-pollination is probably of frequent occurrence.

Note.—In a valuation of the characters of the preceding members of representative Acanthaceous genera, *Ruellia patula* would occupy the lowest place. *Justicia protracta*, if only because of its single pair of stamens, the highest. Yet the stigmata in both species of *Thunbergia* show extreme differentiation, and the interlocking of stamens, style, and stigma in *Thunbergia lancifolia* must count in an estimate of values. Valuation of characters in plants seems to be much like valuation in the ordinary offairs of life. Appraisement of a particular character will vary with the valuator. A frequent and widely-spread source of difficulty to one who essays classification is the failure of the different whorls of the flower to keep step developmentally. One whorl, or more, may show a higher degree of specialization than the rest. In a general way help is found by noticing that certain whorls tend to associate in an adaptive advance, as, *e. g.*, in the case of corolla and stamens, whose advance together is so commonly seen. Ovary and calyx, in the epigynous flower, usually show their partnership clearly enough. In the hypogynous flower close relationship only comes after the fall of corolla and stamens. Thereafter they may develop in company. Style and stigma, ephemeral in their function, may make adaptive partnership with those other passing members of the flower, the stamens.

Thunbergia lancifolia T. And. (no. 1383). The seeds are plano-convex in shape, and resemble a small keelless boat. A light corky rim bounds the edge, forming a small bulwark. As a consequence, the seeds, if thrown into water, always right themselves, floating like miniature coracles. When stranded, they maintain this position. In germination the seed cracks upon the convex side, as may be seen in one of the specimens sent. The reason for the float-apparatus appears to lie in the fact that the rainy season has commenced by the time the seeds are ripe. The local showers are very heavy and the surface of the ground may be all awash for a time, in which case the seeds float off, are deposited in a suitable position for germination, and, at the same time, secure a wider dispersal. One may find seeds of *T. lancifolia* around the plants at the beginning of the rains, but after a few heavy showers they are washed away, and are difficult to find.

Silene Burchellii Benth. (no. 1389). A shade plant, growing beneath trees upon the kopje. The stamens are divided, more or less sharply, into two groups, five long and five short. The anthers of the five long stamens dehisce near the mouth of the floral tube, after which their filaments lengthen, lean aside, and the anthers fall. The five short stamens now appear in the throat of the tube, their anthers likewise dehisce and fall. Meanwhile the three long stigmatic branches have been concealed within the tube, erect, and in close apposition. After the second group of stamens have shed their pollen, the stigmatic arms rise up out of the tube and spread out widely beyond it in three feathery stigmas. A protandry marked off into two stages seems noteworthy. At their origin a long stamen regularly alternates with a short one. The flowers are dull pink in colour, and close during the heat of the day by a rolling inwards of the petals.

Nesæa sp. (near *N. linifolia* Hiern) (no. 1390). The stamens are grouped, more or less completely, into two sets, a long and a short. The two sets may be unequal as regards the number of the component members. The style is well exserted, and leans to one side of the flower, without variation in length. The habitat, like that of *Lythrum Salicaria*, is in damp places. If the two plants had a common ancestor, as seems probable, it is interesting to see, how, with a like impulse to a division of the stamens, the classical example has, in addition, a differentiation of its styles; whilst in *Nesæa*, so far as the writer has observed, the style remains a constant quantity.

Ipomæa simplex Thunb. var. obtusisepala Rendle (no. 1391). The withered stamens and petals, the latter thinned down into membranes, enclose the fruit in its early stages as a thin, protective, papery envelope.

Pterocarpus sp. (no. 1392). The fruits are ripening at the end of December, and a tree in full fruit seen in slanting light makes a striking picture, each wing a halo to the pod it encircles. The trees are plentiful upon the kopje, where the ground is still strewn with the last year's fruit, apparently little the worse for wear. The hairs of the pod are probably defensive. In course of time the longer bristles get broken off, when the pod wears the appearance of a worn-down brush. The flowers appear before the leaves. To get them entails climbing. The tree is of goodly size; is widely distributed upon hill and plain; and thrives in either ferruginous or granite soil.

RUBIACEÆ.

In so far as a study of local examples teaches, the order *Rubiaceæ* is one in which extreme effort is made to obtain a cross. In the higher types a well-marked protandry is the means to the desired end. It seems likely that the strong protandrous bent has been the guiding factor in the building-up of the advanced type of Rubiaceous flower. The more or less completely tubal flower; the anthers backed and buttressed by the corolla-tube; the introrse and early dehiscence; the distally-enlarged style, with its more or less efficient brush or scraper, upon the surface of which the pollen is shed; the functioning of the style as pollen-presenter, with a varying degree of attendant exsertion; and the late development of the stigma, are features commonly seen in the higher types of flower.

Variation in detail is great. The brush may be the comparatively crude one of *Leptactinia lanceolata* K. Schum., where the clavate style is completely clothed externally with upward-pointing furry hair, the two lobes of the stigma afterwards unfolding to display the stigmatic papillæ of their inner surfaces, or, it may be the highly differentiated type seen in *Pavetta stipulopallium* K. Schum., where eight vertical brushes receive the contents of the eight anther-loculi, and atrophy after their burden is shed. In the former example exsertion is slight; in the latter, extreme. The pollen is simply unloaded upon the stylar head, and any sweeping action of the out-growing style is of the gentlest.

The sweeping out of the anthers may be done more or less efficiently, and the throat of the tube is usually clothed with hairs to glean spilt pollen. In a general way one may say the less efficient the harvesting by the stylar brush the more numerous the gleaner-hairs.

PENTANISIA RHODESIANA S. Moore, with forms *a*, *b*, *c*, *d* (no. 1396). Disregarding variation in vegetative characters, one finds in different plant-individuals the following forms of flower:—

Form *a*.—A long-stamened form, in which the stamens stand erect above the mouth of the tube. The filaments take origin just within the throat of the flower. The style and stigma are within the tube, the stylar arms being divergent when still within it. They are covered all over with pointed stigmatic papillæ. There is no stylar brush. The corolla-tube is hairy within, the hairs short, straight, and bristly, growing towards the axis of the tube and occluding its lumen. The anthers dehisce, while the style, with its stigmas still immature, is within the tube. Later the style grows out almost as far as the anthers, when auto-pollination may occur.

Form *b*.—A long-styled form. The style is exserted, has no brush, and does not function as pollen-presenter. The anthers are sessile within the throat of the tube and enveloped by the stiff hairs arising there, upon which the pollen is shed. The hairs point upwards and inwards. In the bud the style has already grown out, and is pressed firmly against the inner surface of the tips of the corolla-lobes, emerging as the bud opens. Self-pollination is thus avoided.

Form *c*.—In this form both anthers and stigma are in the throat of the corolla. It is not an earlier stage of form *b*, as in that form the style projects well beyond the tube in the bud.

Form *d*.—Earlier in the season plant-individuals were seen whose flowers bore long stamens bent horizontally outwards, lying in the intervals between adjacent corolla-lobes. Later in the season this form could not be found. It was at first supposed this might be form *a* at a different stage, but no confirmation of this could be gathered.

As to the number of lobes to the corolla; the normal is five, but there are sometimes four, sometimes six, in which last event the stigma is trifid.

In the Salisbury neighbourhood, *P. rhodesiana* is only found growing in granitic soil. *Monsonia biflora* DC. is another plant confined to the granite area. *Monotes africana* A. DC. var. *denudans* Hiern (no. 1398), a small-sized tree, has like characteristic.

Richardia scabra L. (no. 1397). Grows by the roadside, with small white grouped flowers. Diameter of flower about 5 mm. Calyx of six pointed sepals, fringed with reddish hairs: accrescent in the fruit, to which it forms a star-like crown. Corolla with an infundibuliform tube, normally with six lobes. Stamens erect, springing from the rather wide mouth of the tube, alternating with the corolla-lobes and equalling them in length. Pollen-grains large. Dehiscence introrse. Style long, dividing at the summit into three slightly spreading branches, each branch bearing a rounded, cushion-like lobe covered with stigmatic papillæ. No stylar brush. The stigmatic lobes are at the apex of the bud ready to emerge as it opens. Dehiscence occurs before the flower unfolds. There are a few hairs at the bottom of the corolla-tube, none at the throat. Although small, these flowers are visited by bees.

(To be continued.)

GLOUCESTERSHIRE RECORDS.

By the Rev. H. J. Riddelsdell.

(Concluded from p. 230.)

Vicia gracilis Lois. "33. Flower sp.," *Top. Bot.* The real position is as follows:—*33. Hedge of field, Horcott Hill, Kempsford! *34. Cornfields near Keynsham, Gloucester (1871, *T. B. Flower*, in *Hb. Wats.*). Banks of the Hereford Canal, *Hb. Brody*, 1870. Keynsham itself is, of course, in Somerset; but no doubt Flower's specimen came from Gloucestershire, as he pointedly mentions that county. Keynsham is within half a mile of v.-c. 34. —*V. Cracca* L. var. *argentea* Coss. and Germ. 33. Top of Bourton Downs! Andoversford!—*V. lathyroides* L. Claimed as a record for v.-c. 34 in *Journ. Bot.*, 1907, p. 407. But St. Brody only says, "reported to have been found near the Old Passage." His specimen is (as so often under similar circumstances in his herbarium) from some other source.—†*V. calcarata* Desf. 33. By the Canal, Gloucester, *K. B. Blackburn*, spn.!—†*V. villosa* Roth. 33. Gloucester Docks, *Hb. Brody*. Type!

†*Lathyrus tuberosus* L. 34. Canal side, Lydney!—*L. montanus* Bernh. var. *tenuifolius* Roth. 34. Symonds Yat, *Hb. Trump*! Near Clifton, *Hb. Watson*.—†*L. Ochrus* DC. 33. Near Canal, Gloucester, *K. B. Blackburn*, spn.!

†*Tetragonolobus siliquosus* Roth. 34. Near Chepstow, *Rev. W. Butt.*

†*Prunus domestica* L. 33. Hucclecote, *Hb. Brody*. Brockworth, *Hb. Glos.* Campden, *J. R. Neve*. Guiting! 34. Tidenham! Newent! Over, *Hb. Brody*.—*P. Cerasus* L. 33. Barnsley, *Hb. Trump*! Broad Campden to Blockley, *J. R. Neve*. 34. Foot of May Hill, *Hb. Brody*. Beachley!

Spiræa Ulmaria L. var. *denudata* Boenn. 33. Sandhurst! Hailes! 34. Charfield and Bradley!

Rubus Scheutzii Lindeb. *34. Ruspidge, *Ley*, 1910.—*R. ramosus* Briggs. *34. Apparently this, Lancaut, *Hb. Brody*, fide *W. M. R.*—*R. thyrsoideus* Wimm. *33. Welford Hill, plenty! Eastleach! Seven Springs at Naunton!—*R. Godroni* Lec. & Lam. *33. Bourton Downs, strong form!—Var. *clivicola* Ley. *33. Hill above Withington!—*R. myricæ* Focke var. *hesperius* Rogers. *34. Near St. Briavel's, *Ley*.—*R. lentiginosus* Lees. *34. Cliffords Mesne and May Hill, *Ley*.—*R. macrophyllus* Wh. & N. var. *Schlechtendalii* (Weihe). *34. Box, near Minchinhampton, *E. M. Day*.—Var. *amplificatus* (Lees). *34. Tidenham Chase, near the Church, 1869, *Hb. Brody*. Found there again in 1910 by Messrs. Ley and Shoolbred.—*R. hypoleucus* Lefv. & Muell. *33. Hailes, very large and strong plants!—*R. hirtifolius* Muell. & Wirtg. var. *mollissimus* (Rogers). *34. May Hill! with Rev. A. Ley.—*R. iricus* Rogers. *34. Tidenham Chase woods, plenty, *Ley*, 1910. —*R. pyramidalis* Kalt. *33. Seizincote Warren! Woods about Ford! Hailes, f. *umbrosa*!—*R. leucostachys* × *rusticanus*. 34. Minchinhampton Common! with Mr. Rogers.—*R. lasioclados* Focke. *34. Minchinhampton Common border, locally abundant, *W. M. R.*—*R. cinerosus* Rogers. *34. Eastwood, Tidenham, *Ley*, 1910.—*R. Gelertii* Frider. *34. Gospel Oak, Cliffords Mesne, *Ley*, 1910.—*R. anglosaxonicus* Gelert var. *curvidens* Ley. *33. Ford, by roadside, not quite typical!—Var. *raduloides* Rogers. *33. Edge of wood near Snowshill!—*R. radula* Weihe. *33. Hailes! Near Snowshill! Ling Ground, Taddington!—*R. echinatus* Lindl. 33. Near Snowshill! Hailes! Seizincote Warren! 34. Arlingham! Newent! Pauntley! Cliffs, near Lydney! Wood on Lancaut Cliffs, *Hb. Brody*, 1867.—*R. oigoclados* Muell. & Lefv. var. *Newbouldii* Rogers. *34. Mitcheldean Meend, *Ley*.

—*R. podophyllus* P. J. Muell. *34. Form, on Durdham Down, Bristol, *Ley*.—*R. fuscus* Wh. & N. var. *macrostachys* P. J. Muell. *34. Near Ruspidge, f. *umbrosa*, *Ley*.—Var. *obscurus* (Kalt.). *34. Lower Redbrook, white flowered form, *Ley*.—*R. foliosus* Wh. & N. eglandular form. *34. Tidenham Chase, *Ley*.—*R. foliosus* × *infecundus*. 34. Wood opposite Tintern, *Ley*.—*R. rosaceus* Wh. & N. var. *infecundus* Rogers. *33. Hailes! Stanway Hill! Taddington! Guiting! Mr. Rogers has not seen specimens from v.-c. 33, but is quite satisfied with the naming.—*R. dumetorum* Wh. & N. *33. Form, Pebworth brick pits! Snowshill!—Var. *ferox* Weihe. *33. Kempsford! Eight miles from Cheltenham towards Stow-on-the-Wold! *34. Cliffords Mesne! May Hill!—Var. *diversifolius* (Lindl.). *33. Pebworth!—Var. *raduliformis* Ley. *34. Cliffords Mesne and May Hill! with Mr. Ley.—*R. cæsius* × *rusticanus*. 34. Nailsworth, *E. M. Day*. The above identifications are, except in one case, due to Messrs. Rogers and Ley.

Geum rivale L. *33. Brockhampton, *W. R. Storr*; at 700 ft.

†*Potentilla norvegica* L. 33. Docks, Gloucester, *Hb. Brody*.—*P. erecta* × *reptans*. 34. Near Tidenham Station, *Ley*.—*P. argentea* L. 34. Lancaut Cliffs, *Hb. Brody*.—*P. palustris* Scop. A specimen from *Gloucestershire is in *Hb. Brody*, but I cannot make out the name of the locality. It looks like Springfield, and may be on the north border of the Forest of Dean; that is the most likely spot in Gloucestershire.—*P. recta* L. 33. Waste ground, Brockworth, *Hb. Brody*; Quedgeley, *Journ. Bot.* iv. 122.

Alchemilla vulgaris L. var. *minor* Huds. 33. Guiting, Ford, Snowshill! Upton St. Leonards, *Hb. Sessions*. Witcombe, *Hb. Glos.*, and frequently. 34. Newent, *A. G. Higgins*, spn.! Minchinhampton! Tidenham! &c.

†*Poterium polygamum* Waldst. & Kit. 33. Railway banks between Notgrove and Bourton, *H. P. Reader*. Pitchcombe Wood, *Hb. Brody*. 34. Lydney, canal wall by the Dock! Woodchester, *H. P. Reader*.—*P. officinale* A. Gray. "34. Rec. Cl. 1884–6," *Top. Bot. Supp.* This record is from Dowdeswell in v.-c. 33. But I have record for *34. Forthampton. Poole Keynes, *Miss Mallam*.

Rosa spinosissima L. *33. Bredon Hill, *Cheltenham College Hb.* A very prickly form.—*R. pomifera* Herrm. *33. Coppice wood near Painswick, *Hb. Watson*, ex St. Brody. 34. The locality on Tidenham Chase is well known. Some doubt must, I suppose, remain as to the native status of this rose in both places; particularly in v.-c. 33.—*R. omissa* Déségl. *33. Bourton Downs! With a form going towards the var., fide *Ley*.—Var. *resinosoides* Crépin. *33. Valley near Trafalgar Farm, Ford! *34. Tidenham Chase, *Ley*.—Var. *submollis* (Ley). *33. Cranham Wood, *Hb. Brody*. *34. Minchinhampton Common, *E. M. Day*, spn.!—*R. Andrzeiovii* Steven var. *Sherardi* (Davies). *33. Cranham Wood, *Hb. Brody*. —*R. scabriuscula* Sm. var. *sylvestris* (Lindl.). *34. Nailsworth! —*R. tomentosa* Sm. *33. Near Ford! *34. Minchinhampton Common, *W. M. R.* Amberley, *E. M. Day*. Sapperton Tunnel, west end!—*R. cuspidatoides* Crépin. *34. Overton and Arlingham, *E. M. Day*. Tidenham Chase, *Ley*. Sapperton Tunnel, west end! Frampton Mansell! Near Pinfarthing, on the common!—Var. *britannica* (Déségl.). *33. Near Fairford! fide *Ley*.—Var. *fœtida* (Bast.). 34. Tidenham Chase, *Ley*.—*R. Borreri* Woods. *34. By Minchinhampton Common, *W. M. R.*—Var. *tomentella* (Léman). 33. Prestbury Park, *Hb. Cheltenham College*. Churchdown Hill, *W. M. R.* 34. Overton, *E. M. Day*. Gully, Clifton, *Hb. Brody*. Minchinhampton Common, *E. M. Day*.—Var. *Carionii* (Déségl. & Ozan.). *34. Minchinhampton Common, *W. M. R.*—Var. *arvatica* (Baker). *34. Hedges near Dursley, *Hb. Brody*. "Extreme," teste *Wolley-Dod*.—*R. canina* L. var. *lutetiana* (Léman). Common. A specimen in *Hb. Brody*, from Wyke Cliffs in v.-c. 34 is put by Wolley-Dod "nearest *R. spuria* Puget."—Var. *sphærica* (Gren.). *34. Minchinhampton Common, *W. M. R.* Tidenham Chase, *Ley*.—Var. *syntrichostyla* (Rip.). *34. Lane hedge, Ruardean, *Ley*.—Var. *aciphylla* Rau. *34. Highnam Wood, *Hb. Brody*. Minchinhampton Common, *W. M. R.*—Var. *aspernata* (Déségl.). *33. Hedges, Cemetery, Gloucester, *Hb. Brody*. "Good *aspernata*," *A. H. W.-D.*—*R. dumetorum* Thuill. var. *obtusifolia* (Desv.). 34. Tidenham Chase, *Ley*.—Var. *hemitricha* (Rip.). *33. Hedges, Gloucester, *Hb. Brody*.—*R. glauca* Vill. var. *Crépiniana* Déségl. *33. Hedges near Upton, *Hb. Brody*.—*R. stylosa* Desv. var. *leucochroa* (Desv.). *33. Hedges on Cleeve Hill, *Hb. Brody*.—*R. arvensis* Huds. var. *gallicoides* Baker. *33. Campden!—Var. *scabra* Baker. *34. Stream bank near Ruardean, *Ley* (teste *Wolley-Dod*).

Sorbus Aria Hedl. var. *tomentosa* Gren. & Godr. 34. Selsley Hill! Tutshill! Tidenham Chase!—Var. *incisa* Reichb. 34. Woods, Wotton-under-Edge! Messrs. Ley and Wolley-Dod have kindly named *Rosa* and *Sorbus*.

Cratægus Oxyacantha L. *33. Kempsford! with the hybrid × *monogyna*.

†*Cotoneaster microphylla* Wallich. 34. Tutshill!

Parnassia palustris L. *34. Poole Keynes!

Sedum Telephium L. *33. Banks near Pitchcombe, *Hb. Brody*. Witcombe, *Hb. Glos.*—*S. purpureum* Tausch. *34. Pauntley!—†*S. hybridum* L. 33. Guiting Wood! 34. Coleford!

Drosera rotundifolia L. *34. Near Cinderford, spn.! Near Speech House Road Station, *E. M. Day*. Heaths near Mitcheldean, 1864, *Hb. Brody*. Forest of Dean, *Hb. Glos.* Mitcheldean Meend, *Phytologist*, n. s. iv. 128. It is difficult to see how this species escaped inclusion in *Top. Bot.*—*D. anglica* Huds. *34. Heaths near Mitcheldean, 1864, *Hb. Brody*. True *anglica*!—*D. longifolia* L. 34. Same locality, 1870, *Hb. Brody*. Correctly named.

Myriophyllum spicatum L. *33. Sandhurst! Hailes! Hinchwick! Kempsford!

Callitriche stagnalis Scop. *33. Kempsford! Canal, Stroud! *34. Cerney Wick! S. Cerney! Canal, Stroud! Alvington, &c.; plenty.—*C. intermedia* Hoffm. *33. Ponds, Seven Springs, Cheltenham, *Hb. Brody*.

Peplis Portula L. *33. Badgeworth Wood, *Hb. Brody*, *Hb. Glos.* 34. Broadmoor!

Epilobium parviflorum × *roseum.* 33. By River Evenlode at Kingham, *G. C. Druce.*—*E. montanum* × *obscurum.* 33. Wood, Hailes!—*E. lanceolatum* Seb. et Maur. 34. Quarry, Longhope, *Hb. Brody*, fide E. S. M.—*E. Lamyi* F. Schultz. *34. Walls, Tutshill! The name comes from E. S. M.—*E. palustre* L. *34. Forest of Dean in several spots! Near Over, *Hb. Brody.*

Eryngium maritimum L. *34. Beach, New Passage, *Hb. Brody.* A specimen was gathered at Beachley, in 1910, as I am informed by the Rev. W. Butt, and so still exists in the county (cf. *Journ. Bot.*, 1907, p. 407).

Smyrnium Olusatrum L. *33. Tewkesbury, Mythe Hill, *Hb. Trump*! Beckford, *H. P. Reader.* 34. Tutshill! Beachley! Native, I should say.

Bupleurum tenuissimum L. 34. Shore near Beachley, *Hb. Brody.*

Apium graveolens L. *33. Abundant in ditches throughout the Vale of Severn, *Phytologist*, iii. 548. No doubt native.—*A. nodiflorum* Reichb. fil. var. *pseudo-repens* Wats. 34. Broadmoor!

Pimpinella Saxifraga L. var. *dissecta* With. 33. Ford! Bourton Downs! Near Cirencester, *W. J. Greenwood*, spn.! Kempsford! 34. S. Cerney! Amberley, spn.!

Crithmum maritimum L. *34. Redwick, *E. M. Day*, spn.! One plant only; so probably a dying out species.

Heracleum Sphondylium L. var. *angustifolium* Huds. 33. Sandhurst! Cirencester! Slad, *K. B. Blackburn*, spn.! 34. Symonds Yat, *Hb. Trump*! Minchinhampton! Near Tetbury!

†*Orlaya grandiflora* Hoffm. 34. Sharpness, *Trump*, spn.!

Sambucus nigra L. var. *laciniata* Mill. 34. Near Bristol, *Merrett.* Near Lancaut, *Hb. Brody.*

Galium erectum Huds. *33. Bourton Downs, *H. H. Knight*, spn.! *34. Heath near Dursley, *Hb. Brody.*—*G. Mollugo* L. var. *insubricum* (Gaud.). 34. Pauntley!—Var. *Bakeri* Syme. 34. Severn Bridge, *E. M. Day*, spn.!— × *verum.* 33. Ford! Hinchwick!—*G. palustre* L. var. *Witheringii* (Sm.). The usual form in the county, so far as my experience goes. Mr. Reader finds nothing else round Woodchester.—Var. *elongatum* (Presl.). 33. Kempsford! Cheltenham, *W. M. R.*—*G. Vaillantii* DC. *33. Fairford!

Valeriana officinalis L. *33. Downs near Snowshill! Guiting Wood; and *fl. albo*!

Valerianella carinata Lois. *33. Rocky part of Nottingham Hill, native, *H. H. Knight*, spn.!—*V. dentata* Poll. var. *mixta* (Dufr.). 34. Newent, *A. G. Higgins*, spn.! The specimen in *Hb. Brody* (see *Journ. Bot.* 1907, p. 407) is not the var., I believe. Fr. smooth.

Filago spathulata Presl. *34. Fields, Lancaut, *Hb. Brody.*

Antennaria dioica Gaertn. *34. Heath, Micheldean, *Hb. Brody.* Selsley Hill!

†*Anaphalis margaritacea* Benth. & Hook. 33. Chedworth

Woods, *W. R. Storr*. 34. Symonds Yat, *Hb. Trump*! Woodchester Park, *H. P. Reader*.

Bidens cernua L. *33. Ponds near Gloucester, *Hb. Brody*; most probably v.-c. 33.

†*Ambrosia trifida* L. 33. Canal near Gloucester, *K. B. Blackburn*, spn.! 34. Cinderford, *E. M. Day*, spn.!—†*A. biennis* Willd. 33. Gloucester Docks, *Mrs. Foord-Kelcey*, spn.!

†*Achillea tomentosa* L. 34. Walls, Box Hill, *Hb. Brody*.

†*Anthemis tinctoria* L. 33. Docks, Gloucester, *Hb. Brody*.

Chrysanthemum Parthenium Bernh. var. *breviradiatum* Rouy (of *Pyrethrum*). 33. Wainlode!

†*Matricaria suaveolens* Buchenau. 33. Gloucester Docks, spn.! 34. Charfield!

Artemisia vulgaris L. var. *coarctata* Fors. 33. Charlton Kings, *Hb. Trump*! 34. Brockweir, spn.!

†*Petasites fragrans* Presl. 33. Dowdeswell! Cirencester!

†*Doronicum Pardalianches* L. 33. Docks, Gloucester, *Hb. Brody*. 34. Near Amberley!

†*Senecio squalidus* L. 34. Badminton, *G. C. Druce*. — *S. Jacobæa* L. var. *discoideus* L. 34. Woodcroft, Tutshill, spn.!

Arctium majus Bernh. 33. Kempsford! Ampney St. Peter! Gloucester, *Hb. Brody*. Binton Bridge, Bragington, &c.! Hill top, Hailes!

†*Cnicus tuberosus* Roth. Railway banks, Stonehouse, *Hb. Brody*. It was named *C. Forsteri & C. Woodwardii* variously; but is certainly *C. tuberosus*. Specimen also in *Hb. Br. Mus*. Most likely v.-c. 33, but not certainly. Hardly native here.—*C. acaulis* Willd. var. *caulescens* Pers. 33. Kempsford! Bourton Downs! Eastleach! Upper Slaughter! 34. Saint Vincent's Rocks, *Hb. Brody*. —*C. arvensis* Hoffm. var. *mitis* Koch. 33. Gloucester Docks, *Mrs. Foord-Kelcey*, spn.!—Var. *argenteus* Vest. 33. Gloucester, spn.! Cirencester, spn.!—*C. arvensis* × *palustris*. 33. Wood near Ford! with the parents. Two forms.

†*Silybum Marianum* Gaertn. 33. Gloucester, by the roadside, *Cradock MS*. Sandhurst, *Hb. Brody*.

Serratula tinctoria L. var. *alpina* Gren. & Godr. 33. Meadow, Fairford!

†*Centaurea jacea* L. 33. Docks, Gloucester, *Hb. Brody*.—†*C. spinulosa* Rochel. 33. Docks, Gloucester, *Hb. Brody*.—†*C. melitensis*, L. 33. Docks, Gloucester, *Hb. Brody*.—†*C. salmantica* L. 33. Gloucester, *Hb. Brody*.

†*Crepis taraxacifolia* Thuill. 33. Sandhurst! Snowshill! Kempsford! Cirencester! — *C. capillaris* Wallr. var. *agrestis* Waldst. & Kit. 33. Between Andoversford and Slaughter! Kempsford! 34. Nailbridge! Newent! — *C. biennis* L. *33. Weston-sub-Edge, *J. R. Neve*. Stanley Hill, Winchcomb, *H. H. Knight*, spn.!

Hieracium Pilosella L. var. *nigrescens* Fr. 34. Hudnalls, St. Briavels, teste *Ley*. *Rev. W. Butt* in litt.—Var. *concinnatum* Hanb. 33. Horns Leazor!—*H. hypochæroides* Gibs. 34. Dennel Hill, Tidenham parish, *Hb. Brody*, 1867. — *H. pachyphyllum*

Purchas. 33 or 34. Banks near Stroud, *Hb. Brody*, teste *Ley.*—*H. serratifrons* Almq. var. *lepistoides* Johanns. *33. Near Cheltenham! Leckhampton, *Hb. Trump.* — Var. *torticeps* Dahlst. *33. Leckhampton Hill, *Mrs. Foord-Kelcey*, teste Ley. Wood near Chalford! *34. Symonds Yat! Woods at Wotton-under-Edge! Balls Green! Selsley Hill!—Var. *cinderella* Ley. 34. Symonds Yat!—Var. *crassiceps* Dahlst. 34. Chalford! Parkend! Symonds Yat!—Var. *grandidens* Dahlst. *34. Woodchester to Selsley! Minchinhampton! Sapperton Tunnel!—*H. maculatum* Sm. *34. Railway, Sapperton Tunnel, and fields near! — *H. scanicum* Dahlst. 34. Quarry, Dursley, *Hb. Brody*, fide Ley.—*H. sciaphilum* Uecht. var. *transiens* Ley. *33. Campden! Stanway Hill! Sherborne! Ford! Chalford! *34. Rodboro' Common! Wotton-under-Edge, woods! Hewellsfield! Cliffords Mesne!—*H. cacuminatum* Dahlst. *33. Cheltenham and Charlton, *L. Mott*, spn.! 34. Bromsberrow! Milkwall! — Var. *barbareæfolium* Dahlst. *33. Top of Slad Valley, Stroud, *E. M. Day*, spn.! *34. Symonds Yat, *Ley.*—*H. sabaudum* L. var. *calvatum* Hanb. *34. Quarry, Tutshill!—Var. *virgultorum* (Jord.). *34. Cinderford, *E. M. Day.*—*H. umbellatum* L. *33. Cranham Wood, *Hb. Brody*. Haresfield, *Hb. Sessions.* For most of this knowledge of the Hieracia I am indebted to Mr. Ley.

Hypochæris glabra L. *34. Chase End Hill!

Taraxacum palustre DC. var. *udum* (Jord.). 34. Edge End! Lancaut!

Tragopogon minus Mill. Frequent in 33 and 34.

†*Echinops sphærocephalus* L. 34. Established on the shore at Beachley, 1909!

Jasione montana L. *33. Painswick Hill, *Hb. Brody.*

Campanula persicifolia L. *33. In a piece of rough untouched land, from which rabbits and deer have been recently excluded by wire; Colesborne! Native, I think. — †*C. rhomboides* L. 34. Banks, Dursley, *Hb. Brody.*

Legousia hybrida Delarbre. *34 (for certain). Beachley, *Hb. Br. Mus.* Compton Green! Woodchester, *H. M. Middleton*, spn.!

†*Specularia Speculum* DC. 33. Llanthony Priory, Gloucester, *Mrs. Foord-Kelcey.*

Monotropa Hypopitys L. var. *hirsuta* Roth. 33. Oakley Park, Cirencester, *Hb. Br. Mus.*

Limonium vulgare Mill. "34?" *Top. Bot.* *34. Avonmouth, *H. P. Reader.*

Hottonia palustris L. "33 or 34. Lees, sp.," *Top. Bot.* *33. Town Ham, Gloucester, *Hb. Glos.* 1846. Pools near Gloucester, *Hb. Brody.* Ditches near Mythe Bridge, Tewkesbury, *Serocold's Forthampton list.* *34. Ditch near Forthampton Court, *Botany of Malvern Hills.*

Fraxinus excelsior L. var. *heterophylla* (Vahl.). 34. Woodchester, *Hb. Watson.*

Centaurium pulchellum Druce. †33. Docks, Gloucester, *Hb. Brody.* 33 or 34. Near Stroud, *Hb. G. W. Sandys*! *34. Poole Keynes, spn.! from Miss Mallam, 1910.

Gentiana campestris L. *33. Westington Hill, *J. R. Neve*; I think I saw specimens. Pasture near Northleach, *Hb. Brody.* *34. Lassington Hill, *Hb. Glos.*

Nymphoides peltatum Rendle & Britten. *33. Coombe Hill Canal, *Hb. Glos.*, *Hb. Brody*, *Hb. Br. Mus.* Most likely native here.

Symphytum officinale L. var. *patens* (Sibth.). 34. By Rivers Ell and Leadon! 33 and 34. By Canal, Stroud to Frampton Mansell!—†*S. asperrimum* Donn. 33. The true plant near Fairford! —†*S. peregrinum* Ledeb. 33. Whittington! 34. Lydney! Woodchester!

Myosotis repens G. & D. Don. *33. Boggy places, Brockworth, *Hb. Sessions.*

Verbascum nigrum × *Thapsus.* 34. One plant near Woodchester, *H. P. Reader.*—*V. nigrum* L., *fl. albo.* 33. Hinchwick!

Linaria repens Mill. *33. Old Walls, Painswick, *Hb. Brody.* *34. Reported from West Gloucester by Mr. S. J. Coley, of Stroud. —*L. vulgaris* Mill var. *latifolia* Bab. 33. Field near Oakley Park, near Sapperton, *W. J. Greenwood*, spn.!

†*Mimulus Langsdorffii* Donn. 33. Bibury! River Windrush below Guiting! Campden, *J. R. Neve.* 34. Near canal above Stroud! Near Pinfarthing!

Digitalis purpurea L. *33. Very rare. Marl Hill, Cheltenham, *Hb. Brody.* Westington Hill, *J. R. Neve.* Coventry Park near Winchcombe, *Hb. Sessions*; here very likely introduced.

Euphrasia Rostkoviana Hayne. *33. Pastures near Gloucester, *Hb. Brody.* *34. Edge End, Tidenham, Minchinhampton Common! — *E. stricta* Host. *34. Symonds Yat, *Hb. Brody*, teste E. S. M.—*E. nemorosa* H. Mart. *33. Woods near Ford and Guiting! Bourton Downs and Hinchwick! 34. May Hill! Balls Green and Gatcombe Wood!

Rhinanthus stenophyllus Schur. *33. Bourton Downs!

Melampyrum pratense L. var. *latifolium* Schreb. & Mart. 34. Lydney! Lancaut Cliffs, *Hb. Brody.*

Orobanche Hederæ Duby. *33. Ampney St. Peter!

Mentha longifolia Huds. *33. Upton St. Leonards, *Hb. Witts.* —*M. rubra* Sm. *33. Upton St. Leonards, *Hb. Witts.* *34. Longhope, *Hb. Brody.* Wyeside, Symonds Yat, *Hb. Brody.*—*M. gentilis* L. *34. Banks of Wye below Symonds Yat, *Hb. Brody.* Cinderford, *E. M. Day*, spn.!—*M. arvensis* L. var. *parietariæfolia* (Beck.). 33. Coomb Hill Canal, *Hb. Brody.*—Var. *nummularia* (Schreb.). 34. Tidenham Chase.

Thymus Chamædrys Fr. *33. Painswick, *H. P. Reader.* Dodwell Quarries; Fairford to Quenington! 34. Besboro' Common, *Hb. Watson.* Forest of Dean!—*T. præcox* Opiz. *33. Guitinghill Farm, and near Syreford! Rev. E. F. Linton agrees to this naming.—*T. ovatus* Mill. *34. Edge of Minchinhampton Common, *W. M. R.*

Calamintha Nepeta Savi. 34. Saint Vincent's Rocks, *Sibthorp* MS., 1780, teste Druce. Blaise Castle Woods, *Hb. Br. Mus.* A specimen in *Hb. Watson* from Penpole Hill is *C. officinalis.*

†*Salvia verticillata* L. 33. Llanthony Priory, Gloucester, *Mrs. Foord-Kelcey.*—*S. pratensis* L. See *Journ. Bot.* 1907, p. 408. St. Brody's specimen is not from Wyck Cliffs; he only speaks of the species as "reported."

Galeopsis angustifolia Ehrh. var. *canescens* (Schultz). 33. Fields, Upton St. Leonards, *Hb. Brody.*—†*G. dubia* Leers. 33. Clover field, Cleeve, and Gloucester Docks, *Hb. Brody.* Perhaps not native even at Cleeve.—*G. Tetrahit* L. var. *bifida* (Boenn.). 33. Shady coppice, Birdlip, *Trump*, spn.! Near Guiting! 34. Longhope Wood, *Hb. Brody.*

Lamium hybridum Vill. *33. Fields and waste places, Gloucester, *Hb. Brody.*

Ballota nigra L. var. *borealis* (Schweigg.). 34. Newent neighbourhood, common! Lydney!—†*B. ruderalis* Sw. 33. Waste ground, Docks, *Hb. Brody.*

Plantago major L. var. *intermedia* (Gilib.). 33. Mickleton, &c.! Kempsford! Ford! 34. Arlingham! Pauntley! Staunton! Stroud to Frampton Mansell!—*P. lanceolata* L. var. *sphærostachya* Röhl. 33. Near Snowshill! Guitinghill Farm! 34. Chase End Hill! Drybrook! Speech House Road! Edge End! Milkwall!—Var. *Timbali* Reichb. fil. 34. Woodchester, spn.!—*P. Coronopus* L. var. *pygmæa* Lange. 34. Chase End Hill!—†*P. arenaria* Waldst. & Kit. 33. About Gloucester, *Hb. Brody, &c.*

Chenopodium polyspermum L. *34. Fretherne, *E. M. Day.* Sharpness, spn.! Slimbridge, *H. P. Reader.* Poole Keynes, spn.!—*C. album* L. var. *paganum* (Reichb.). 33. Kempsford! Guiting! Gloucester, *Hb. Brody.* 34. Oxenhall! Newent! &c.—*C. serotinum* L. 33. Gloucester Docks, *Hb. Brody.*—*C. urbicum* L. *34. Tidenham, spn.! Arlingham, var. *intermedium* Moq. *E. M. Day*, spn.!—*C. glaucum* L. *33. Fields near Gloucester, *Hb. Brody.*

Beta maritima L. *33. Banks of Severn near Gloucester, *Hb. Brody.*

Atripex patula L. var. *erecta* (Huds.). *33. Cheltenham! Hailes! Kempsford!—*A. deltoidea* Bab. *33. Cheltenham! Ford! Fields near Gloucester, *Hb. Brody.*—*A. portulacoides* L. *34. Shirehampton marshes, *Hb. Brody.*

Salicornia stricta Dum., *S. ramosissima* Woods. 34. Tidenham parish; specimens from Rev. W. Butt.—*S. procumbens* Sm. 34. Beachley, *Hb. Brody.*

Salsola Kali L. *34. Shore, New Passage, *Hb. Brody.*

Polygonum Convolvulus L. var. *subalatum* V. Hall. 33. Guitinghill Farm; 34. Compton Green! Henbury, *Hb. Br. Mus.*—*P. dumetorum* L. †33. Docks, Gloucester, *Hb. Brody.* *34. Near Redbrook, *H. H. Knight*, spn.! Mr. Purchas found it there many years ago; his specimen is now in the possession of Mr. Ley.—*P. Raii* Bab. *34. Shore, New Passage, *Hb. Brody.* St. Brody named it *maritima*; it is certainly *Raii*, as Mr. White pointed out in *Journ. Bot.* 1907, p. 408.—*P. minus* Huds. *33. Ponds near Gloucester, *Hb. Brody.*—*P. mite* Schrank. *34. By Symonds Yat, *W. M. Rogers.* Newent Canal, *Hb. Brody*, 1867.—*P. Persicaria* L. var. *elatum* Gren. & Godr. 33 (or 34). Stroud, *Hb. Sandys.*

Rumex maritimus L. *34. Maisemore, *Hb. Glos.* (This may be in v.-c. 33.) Arlingham! Walmour Common, *Hb. Glos.* Marshes, Lydney, *Hb. Brody.*—*R. crispus* L. var. *elongatus* (Guss.) 34. Near Tintern, *Ley.*

Daphne Mezereum L. Both at Painswick in v.-c. 33 and round Lancaut in v.-c. 34, this is, or was, most probably native. It is dug up by cottagers for their gardens. Very seldom seen now.

†*Euphorbia Esula* L. 33. Gloucester Docks, *K. B. Blackburn*, spn.!—*E. exigua* L. var. *retusa* L. 33. Leckhampton, *Hb. Trump.* —*E. Lathyrus* L. *33. Wainlode Hill, copse; native, I believe.

Mercurialis annua L. *33. Fields, Gloucester, *Hb. Brody.* Kempsford, *Rev. W. Butt.*

Ulmus glabra Miller var. *minor* Miller. 34. Bishops Wood, Forest of Dean, *Ley.*

Carpinus Betulus L. *33. Colesborne! Hinchwick! But is it a native in Gloucestershire at all?

Salix triandra L. *33. Kempsford, plenty, with var. *Hoffmanniana* Sm.! About Ford! Hailes! Slaughter! Cheltenham! Sandhurst, &c.!—*S. fragilis* L. Most of our trees are var. *britannica*; but type grows at 33. Kempsford!—*S. decipiens* Hoff. *34. Banks near Lydney, *Hb. Brody*, fide E. F. L.—*S. purpurea* × *viminalis.* 33. Kempsford! — *S. Caprea* × *cinerea.* 33. Kempsford! fide E. F. L.—*S. aurita* × *cinerea.* 33. Near Fairford! 34. Newent Canal, *Hb. Brody.* Both named by Mr. Linton.

Helleborine longifolia Rendle & Britten. *33. Wood near Northleach, *Hb. Brody*, 1869. Puckham Marsh, spn.!

Orchis ustulata L. *34. Lydney Park, *Lightfoot*, 1773.—*O. latifolia* L. *34. Bream to Lydney! Newent! Dymock Wood! S. Cerney!—*O. ericetorum* Linton. *34. Dymock! Milkwall to Coleford!

†*Crocus officinalis* Huds. 33. Fairford, one specimen in a meadow, *G. C. Druce*, 1910.

Asparagus maritimus Mill. 34. "Marshes of Tidnam near Chipstoll," *Parkinson, Theatr. Bot.* 455. Is not this species native in 34?

†*Allium roseum* L. 34. St. Vincent's Rocks, *Hb. Trump.*

Lilium Martagon L. *34. Woods near Tidenham Chase! I believe native; escape at †33. Lechlade.

Tulipa sylvestris L. *33. Fairford, *Hb. Druce.* Frith Wood, *Hb. Brody.*

Juncus bufonius var. *fasciculatus* (Bert.). 34. Sharpness, *H. P. Reader.* 33 or 34. Banks near Berkeley Canal, *Hb. Brody.* —*J. Gerardi* Lois. *33. Elmore Back! *34. Arlingham! Alvington! Lydney! &c.—*J. inflexus* L. *33. Common.—*J. diffusus* Hoppe. *Top. Bot.* has got the records wrong. *33. Brickpits, Sandhurst! Near Oddington *Bot. Rec. Club Rep.* 1884–6. (*Top. Bot.* assigns this record to v.-c. 34.) 34. Woodchester Park, *H. P. Reader.*—*J. maritimus* Lam. *34. Severn Bridge, *E. M. Day*, spn.! Marshes, New Passage, *Hb. Brody.*—*J. bulbosus* L. *33. Marshy ground, Windrush, *Hb. Brody.*

Luzula multiflora DC. *33. Bourton Downs and Snowshill! Cleeve Wood, *Hb. Brody*. Kempsford, &c.!

Sparganium erectum L. *33. Kempsford! this segregate.—*S. neglectum* Beeby. *33. Several places by the Upper Windrush! *34. Frampton on Severn! — *S. minimum* Fr. *33. Berkeley Canal, *Hb. Brody*; a locality interpreted as "all canals near Gloucester" in *Journ. Bot.* iv. 122. This decides the v.-c. The specimen is rather imperfect, but the identification is almost certainly correct. 34. Mr. Reader thinks he found flowerless specimens of this species in the lakes of Woodchester Park.

Lemna gibba L. *33. Kempsford!

Alisma lanceolatum With. *33. Kempsford! Canal, Stroud! Dorsington! Also on the W. Gloucester side of the Stroud Canal, v.-c. 34.

Potamogeton alpinus Balb. *33 or 34. Streamlet near Stroud, *Hb. Brody*, 1870.—*P. zosterifolius* Schum. *33 or 34. Berkeley Canal, *Hb. Brody*.—*P. acutifolius* Link. *34. Hereford Canal, *Hb. Brody*.—*P. obtusifolius* Mert. & Koch. 33 or 34. Pond near Chalford, *Hb. Brody*. Mr. Bennett has kindly named the above.

Zannichellia pedunculata Reichb. *34. Ditches near Purton, *H. P. Reader*. Aust Cliff, *Hb. Br. Mus.* Mr. Shoolbred tells me he found it, in 1910, between Tutshill and Beachley.

Eleocharis multicaulis Sm. *34. Broadmoor! Serridge Green!

Scirpus fluitans L. 34. Broadmoor! Ponds, Forest of Dean, *Hb. Brody*.—*S. maritimus* L. var. *conglobatus* Gray. 34. Arlingham!

Eriophorum vaginatum L. *34. Marsh, Mitcheldean, *Hb. Brody*.—*E. angustifolium* Roth. *34. Old clay pit, Drybrook! Marsh near Mitcheldean, *Hb. Brody*. Brimscombe, *E. M. Day*. *Top. Bot.* asks, "Is 34, W. Glos., a real exception?" Was not the answer to this question given beforehand in *Phytologist* n. s. iv. 128; the locality there mentioned being Mitcheldean Meend.

Rynchospora alba Vahl. *Hb. Brody* has a specimen from "Marsh near North" as a Gloucestershire plant. Does this mean Northleach? This would be v.-c. 33.

Schœnus nigricans L. *33. Sevenhampton Common, *H. P. Reader*.

Carex contigua × *vulpina*. 33. Probably this at Pebworth!—*C. muricata* L. (*Pairæi* F. Schultz). *34. Chase End Hill! fide E. F. L. Woodchester, *G. C. Druce*. — *C. remota* × *vulpina* (*axillaris* Good.). *33. Hailes! 34. Awre, *E. M. Day*, spn.! Arlingham! Sharpness, *Hb. Brody*. Lydney!—*C. gracilis* Curt. var. *prolixa* (Fr.). 33 and 34. Brick pits, Sandhurst.—*C. pilulifera* L. *33. Bourton Downs, *H. H. Knight*, spn.!—*C. distans* L. *33 certainly. Frequent about the Colne and the Canal, parish of Kempsford! 34. Poole Keynes, inland!—*C. fulva* Host. *34. Sharpness and Woodchester, *H. P. Reader*.—*C. flava* × *fulva*. 33. Andoversford, *Druce*.—*C. Oederi* Retz. *34. Grange Common, *Hb. Brody*.—Var. *œdocarpa* And. 34. Drybrook! Broadmoor, &c., in Forest of Dean!—*C. Pseudo-Cyperus* L. *33 and 34. Brick pits, Sandhurst!—*C. vesicaria* L. *34. Newent Canal, 1864, *Hb. Brody.*

†*Setaria viridis* Beauv. 33. St. Brody certainly found it in E. Gloucester. But it is an alien, though *Top. Bot.* does not say so.

†*Phalaris minor* Retz. 33. Tuffley, *Hb. Brody.* Rightly named.

Alopecurus æqualis Sobol. *33. Banks of the Severn near the Docks, Gloucester, *Hb. Brody.* Right, I believe. Probably a native.

Phleum pratense L. var. *nodosum* L. 33. Fields near Gloucester, *Hb. Brody.* Upper Slaughter! Aldsworth!—*P. arenarium* L. cf. *Journ. Bot.* 1907, p. 408. Only "reported" from the New Passage; St. Brody's specimen does not come from there.

Agrostis canina L. *33. Heath, Windrush, *Hb. Brody.*—*A. alba* L. var. *stolonifera* L. 33. Kempsford! Near Cirencester, *R. Y. Stapledon.* 34. Sandy banks, New Passage, *Hb. Brody.*—Var. *maritima* Meyer. 34. Arlingham, by the Severn!

Holcus mollis L. 34. Not uncommon in some parts of the Forest of Dean. Chalford! and various other localities. See *Journ. Bot.* 1910, p. 19.

Molinia cærulea Moench. 33. Kempsford! Very small form in the wet meadows between Whelford and Fairford, with *Carex tomentosa*, *Serratula*, &c.; probably var. *depauperata.*

Poa pratensis L. var. *angustifolia* (L.). 33. Woods near Ford!—Var. *subcærulea* (Sm.). 33. Kempsford! 34. Pauntley and Bromsberrow! Worrall Hill! Alvington! Cerney Wick! Arlingham!—*P. palustris* L. var. *effusa* Asch. & Grbn. This is, after all, in v.-c. 34, not v.-c. 33, as I wrongly supposed.

Glyceria fluitans × *plicata* (*G. pedicellata* Towns.). Not uncommon in 33 and 34!—*G. declinata* Bréb. *34. Near Pinfarthing!—*G. rupestris* E. S. Marshall. 34. Beachley, *Hb. Brody*, 1867.

Festuca elatior L. var. *arundinacea* (Schreb.). 33. Hill above Hailes! Whittington! Sandhurst! 34. Arlingham! Shore, Beachley, *Hb. Brody.*

Lolium perenne L. var. *cristatum* Doell. 34. Moist meadow by River Ell near Newent! Bradley! Minchinhampton!—Var. *tenue* (L.). 34. Apparently this, in copses at Lydney and Tutshill!—†*L. temulentum* L. 33. Kempsford! Docks, Gloucester, var. *arvense* (With.), *Hb. Brody.*

Agropyron repens Beauv. var. *barbatum* Duval-Jouve. 33 and 34. Not infrequent.

Hordeum marinum Huds. 34. New Passage, *Hb. Brody* and *Hb. Br. Mus.*

†*Crypsis schenoides* Lam. 33. Canal side, Gloucester, *K. B. Blackburn*, spn.!

Asplenium lanceolatum Huds. 34. Beachley, *Moore, Br. Ferns, &c.*

Ceterach officinarum Willd. var. *crenatum* Milde. 34. Fairly good examples of this, from a wall on Tidenham Chase!

Lastrea montana T. Moore. *33. Cranham Wood, *Hb. Brody.*

Polypodium vulgare L. var. *serratum* Willd. and var. *cambricum* Willd. 34. Flaxley Wood, *Hb. Brody.*

Botrychium Lunaria Sw. *34. Rough pasture on Tidenham Chase, 1910! Near Dudbridge Railway Station, *S. J. Coley.*

Equisetum arvense L. var. *nemorosum* Braun. Fairly frequent in shady ditch sides, woods, &c., in 33 and 34. This variety I take to be represented by a large, lax, long-branched form, which is usually somewhat compoundly branched.—*E. sylvaticum* L. *34. Forest of Dean, *Hb. Brody.* Near Speech House Road Station, *E. M. Day.*—*E. palustre* L. var. *nudum* Newm. 34. Heath near Mitcheldean, *Hb. Brody.*—Var. *polystachyum* Weigel. 33. Puckham Bog, *Hb. Trump*! 34. Woodchester, *H. M. Middleton*, spn.! —*E. limosum* L. *34. Canal above Stroud! S. Cerney! River sides about Newent! Speech House Road! and other places with var. *fluviatile* (L.).

Lycopodium alpinum L. "33, Reader sp." *Top. Bot.* This should be *34, of course.

Chara fragilis Desv. *33. Taddington! Canal &c., near Kempsford! Pond at S. Cerney Station!—*C. hispida* L. *33. Canal, &c., Kempsford!—*C. vulgaris* L. *33. Canal, &c., Kempsford! Sireford Pool, *W. R. Storr.* Dorsington! f. *longibracteata papillata refracta.* Cheltenham! 34. Pool by canal above Stroud! Pits near Newent Canal, *Hb. Brody.* Arlingham!

Tolypella glomerata Leonh. *33. Pool by canal, Chalford!—*T. intricata* Leonh. *34. Ditches near Newent Canal, *Hb. Brody.*

Nitella opaca Agardh. 33 or 34. Pond, Berkeley Canal (or Berkeley), *Hb. Brody.*

Messrs. Groves have kindly named *Characeæ.*

THE HEPATICS OF NEW ZEALAND.

By L. S. Gibbs, F.L.S.

The following collection was made in 1907 in the spring of the year (October and November), when the Liverwort flora is apparently in full fruiting season.

Two localities were chiefly worked, the Nihotupu Hills, in the vicinity of Auckland, of which the long low foot-hills are all cleared, but the main range, about a thousand feet, still carries some good mixed forest; and to the south of Auckland, in the Thames district, at Te Aroha, which lies at the foot of Te Aroha Mountain, 3000 ft. in height, whose slopes are clothed with very fine virgin mixed forest, fortunately to a certain extent reserved. For the choice of this locality, which proved a very successful one, I was indebted to the advice of Mr. D. Petrie, Chief Inspector of Schools at Auckland, who has contributed largely to a greater knowledge of the *Hepaticæ* of his native country. It yielded a new *Calobryum*, a genus in which, hitherto, only two species have been known.

The collection was restricted, with one or two exceptions, to the mixed forest of Polynesian type, which finds its southernmost limit in New Zealand. The incidence of this formation there is determined chiefly by the rainfall, therefore characteristic of the extreme north of the North Island and the west coasts of both the North and South Islands, where the latter is very heavy. This formation was particularly interesting to me, as I had just spent the three previous months (equivalent to the same season of the year) in Viti Levu, Fiji. There, in the glorious mixed forests of that favoured island, the Liverworts, which form an important component of the floristic composition of this type of forest, were also, as was the case about Auckland, at their best. The affinity and similarity of types and habitat was most striking, both in the cryptogams as well as in the phanerogams.

In Hepatics, *Schistochila appendiculata* was a very conspicuous and general type, draping and hanging from dead wood and trunks of trees; the yellow-green thalli often three-quarters of an inch broad and hanging down five or six inches, terminated by one or two sporangiophores. *Schistochila heterodonta* Col. of similar size and habit was also general in the forests of Viti Levu, but not seen in fruit. *Symphogyna brevicaulis* was partial to tree-fern stems, as is *Symphogyna vitiensis* Jack et Steph. in Fiji.

The most striking analogy, however, was to be seen in a patch of *Treubia insignis* in full fruit, spreading over stones and stumps from bank to bank in a small shallow stream which fell into the Nihotupu River, identical in form and habitat with *T. bracteata* Steph., so familiar to me in Viti Levu. (See Journ. Linn. Soc. Bot. xxxix. 194, 1909.)

Goebel (*Flora*, v. 96, p. 187, 1906) records this plant (in sterile condition) in New Zealand at Dunedin and Otira Gorge, in the South Island, and near Wellington, at Kaitoki, in the North Island. He remarks that the sporadic occurrence of this genus in Java in comparison with its wide distribution in New Zealand leads one to infer that it is there outside the centre of its region of distribution. One species having been found in Samoa, he concludes the genus undoubtedly belongs to the Pacific–New Zealand region, and that Java is one of its most western localities. The fact that *T. bracteata* Steph., the Samoan species, was found by me occurring abundantly in Viti Levu, up to 3000 ft., whereas recently, in North Borneo, I did not see the genus at all, would seem to support this hypothesis.

Goebel observed a difference in the size of the New Zealand plants which came under his observation, as compared with the Javan species *T. insignis*, which was first collected by him. He mentions the fact that the New Zealand plant is smaller; at Te Aroha I saw some thalli similar in habit and of smaller size, but not being in fruit they were not collected. My Nihotupu specimens of *T. insignis*, however, were very much larger and identical in size and habit with *T. bracteata*, as seen by me in Fiji.

In all, forty-one species in twenty-one genera were collected, but these only represent those seen in fruiting condition. It was my intention to have given the distribution in relation to the habitat of the species enumerated for New Zealand, but that has proved impossible. Recent collections in that country are very sparsely represented at Kew and at the British Museum, and in the case of the older ones the labels are generally without precise locality. The general distribution is as given by Herr F. Stephani in his *Species Hepaticarum.*

My thanks are due to Herr Stephani for kindly consenting to determine this collection; also to Mr. Gepp, of the British Museum. Four new species are enumerated, viz. *Marchantia laceriloba* Steph., *Aneura papulolimbata* Steph., *Calobryum Gibbsiæ* Steph., and *Lepidozia Gibbsiana* Steph. These species have not yet been described, as Herr Stephani has been obliged to postpone microscopic work for the present, but they will be published in due course.

MARCHANTIACEÆ.

Fimbriaria australis Tayl. in Journ. Bot. (1844), 573.

Auckland, Weitakere Falls, 1000, on banks in forest. ♀ Oct. 1027.

Distrib. Thames, Auckland.

F. tenera Mitt. in Fl. N. Zel. ii. 170 (1855).

Auckland, Nihotupu Falls, 1000, Pipe Track, on ground in open. ♀ Oct. 1028.

Distrib. Little Barrier Island, Thames. (Tasmania, *teste* Mitten.)

Marchantia cephaloscypha Steph. in Hedwigia, xxii. 51 (1883).

Auckland, Weitakere Falls, 1000, on rocks, open. ♂ Oct. 1035. Nihotupu Falls, 1000, Pipe Track, open. ♀ Oct. 1034.

Distrib. Waikato, Thames, Ohinemutu, Kana Kana River, Waimati. Auckland and Campbell Islands. (Tasmania, Australia, Fuegia, Patagonia, Chile.)

Marchantia laceriloba Steph., sp. nov.

Auckland, Nihotupu Falls, 1000, Pipe Track, on ground, open. ♂ Oct. 1032.

M. pileata Mitt. in Fl. N. Zel. ii. 169 (1855).

Te Aroha, on clay, forest. ♀ Nov. 1069.

Distrib. New Zealand.

JUNGERMANNIACEÆ ANACROGYNEÆ.

Aneura alterniloba Tayl. in Journ. Bot. 572 (1844).

Te Aroha, 2500, on rotten wood, stones, and steep banks, forest. ♂, ♀ Nov. 1048.

Distrib. Auckland, Greymouth. New Zealand.

A. eriocaula (Hook.) Steph. in Bull. Herb. Boiss. (1899), 671.

Te Aroha, 1500, on dead wood, forest. ♀ Nov. 1050. Wairongamai, 1000, on dead wood, forest. ♀ Nov. 1068.

Distrib. Gt. Barrier Island, Pt. Nicholson, Dusky Bay, Otago. (Tasmania.)

Aneura papulolimbata Steph., sp. nov.

Te Aroha, Wairongamai Mine, 1000, on clay banks, forest. ♀ Nov. 1064, p. p.

A. marginata Col. in Trans. N. Zeal. Inst. xviii. 253 (1885).

Auckland, Nihotupu, 1000, dead wood, forest. ♀ Oct. 1014 Te Aroha, Tui Mine, 1000, dead wood, forest. ♀ Nov. 1053.

Distrib. Gt. Barrier Island, Greymouth. (Queensland.)

A. micropinna Steph. in Hedwigia, xxxii. 24 (1893).

Auckland, Nihotupu Falls, 1000, Pipe Track, thickly carpeting banks, exposed. ♂, ♀ Oct. 1031. Te Aroha, Tui Mine, 1000, on stones and banks, forest. ♂, ♀ Nov. 1054.

Distrib. Gt. Omaha, Te Whan, Greymouth. (Savaii.)

A. polymorpha Col. in Trans. N. Zeal. Inst. xxii. 457 (1889).

Te Aroha, 3000, on ground, forest. ♀ Nov. 1044.

Distrib. Gt. Barrier Island, Hawke's Bay, Campbell Island.

Hymenophytum crassicostum Steph.

Auckland, Nihotupu, 1000, on ground, forest. ♀ Oct. 1006.

Distrib. Endemic.

H. leptopodium (Tayl.) Steph. in Mém. Herb. Boiss. no. 11 (1900), p. 5.

Auckland, Nihotupu Falls, 1000, on ground, forest. ♀ Oct. 1005. Te Aroha, 2500, on stones, covering in sheets. ♀ Nov. 1046.

Distrib. Gt. Barrier Island, Kinitaki Mountain, Wellington, Greymouth, Stewart Island. (Tasmania.)

H. phyllanthus (Hook.) Steph. in Mém. Herb. Boiss. no. 11 (1900), p. 3.

Auckland, Nihotupu, 1000, on dead wood, forest. ♀ Oct. 1024. On ground, forest. 1029.

Distrib. Otago, Dusky Bay, P. William. Auckland Islands. (Victoria, Tasmania.)

This plant is not uncommon, but is generally put under *Symphyogyna* in herbaria, the very transient sexual branches, which are hidden under the thallus, being overlooked.

Pallavicinius innovans Steph. in Mém. Herb. Boiss. no. 11 (1900), p. 9.

Auckland, Nihotupu, 1000, on banks, forest. ♀ Oct. 1012.

Distrib. New Zealand, Campbell Island.

Symphyogyna brevicaulis Col. in Trans. N. Zeal. Inst. xviii. 251 (1885).

Auckland, Nihotupu, 1000, on tree-fern stems, forest. Oct. 1010.

Distrib. New Zealand.

S. crassicosta Steph. in Mém. Herb. Boiss. (1900), 27.

Te Aroha, Tui Mine, 1000, on stones, forest. ♂, ♀ Nov. 1051.

Distrib. Tauranga.

S. grandibracteata Steph. in Mém. Herb. Boiss. (1900), 26.

Auckland, Nihotupu, on clay banks, forest. ♂, ♀ Oct. 1018, 1016, 1019, 1025*bis*. On dead wood, forest. ♀ Oct. 1033.

Distrib. New Zealand.

S. hymenophyllum (Hook.) M. & N. in Gottsche Lindenb., and Nees, Syn. Hep. 480 (1846).

Wellington, Dale's Bay, mixed beech forest. ♀ July. 1002. Auckland, Nihotupu, 1000, on clay banks, forest. ♀ Oct. 1017. Te Aroha, Wairongamai Mine, 1500, on clay banks, forest. ♂, ♀ Nov. 1065.

Distrib. New Zealand.

S. rhodina Tayl. in Journ. Bot. (1845), 93.

Te Aroha, 1000, on stones, forest. ♀ Nov. 1060.

Distrib. New Zealand. (Tasmania.)

Monoclea Forsteri Hook. Musci Exot. t. 174 (1820).

Auckland, Nihotupu Falls, 1000, on dead wood, 1003; on ground by river, forest. ♀ Oct. 1007.

Distrib. New Zealand. (Patagonia.)

Treubia insignis Goebel in Ann. Jard. Buitenz. ix. p. 1 (1891).

Auckland, Nihotupu Falls, 1000, on ground, forest. ♂, ♀ Oct. 1001.

Distrib. Java. Tahiti.

A beautiful and rare plant, sent in splendid (fruiting) condition. It was known heretofore, as far as the New Zealand plant was concerned, only in sterile state, and we now know that the New Zealand plant is not a new species.

Calobryum Gibbsiæ Steph., sp. nov.

Te Aroha, Wairongamai Mine, 1000, on clay banks, forest. ♂, ♀ Nov. 1064, p. p.

A very interesting plant; a genus in which only two species are known, and the third has been sent in very complete condition.

JUNGERMANNIACEÆ ACROGYNÆ.

Lophocolea biciliata (Tayl.) Mitt. ex Steph. in Bull. Herb. Boiss. (1906), p. 794.

Te Aroha, 1000, on dead wood. ♀ Nov. 1055.

Distrib. New Zealand.

Chiloscyphus renistipulus Steph. in Hedwigia, xxxii. (1893), 326.

Te Aroha, Wairongamai Mine, 1500, on dead wood, forest. ♀ Nov. 1067.

Distrib. New Zealand.

Saccogyna australis Mitt. in Fl. N. Zel. ii. 145 (1855).

Te Aroha, 1500, on dead wood, forest. ♀ Nov. 1049.

Distrib. New Zealand.

A very rare plant.

Lembidium ventrosum Mitt. in Journ. Linn. Soc. xv. 69 (1876).

Auckland, Nihotupu Hills, 1000, on ground, forest. ♀ Oct. 1015.

Distrib. Gt. Barrier Island. Kerguelen Islands.

Mastigobryum Kirkianum Steph. in Bull. Herb. Boiss. (1908), 771.

Auckland, Nihotupu Falls, 1000, at base of tree-ferns, forest. ♀ Oct. 1011.

Distrib. Gt. Barrier Island.

M. Taylorianum Mitt. in Fl. N. Zel. ii. 147 (1855).

Auckland, Nihotupu Hills, 1000, on dead wood, forest. ♀ Oct. 1020.

Distrib. New Zealand. (Samoa.)

Lepidozia Beckettiana Steph. Sp. Hep. iii. 593, 1909.

Auckland, Nihotupu Falls, 1000, on dead wood, forest. ♀ Oct. 1013.

Distrib. New Zealand.

Lepidozia Gibbsiana Steph., sp. nov.

Te Aroha, 2500, on stones and rotten wood, forest. ♀ Nov. 1041.

L. hepaticola Steph. Sp. Hep. iii. 592, 1909.

Auckland, Nihotupu, 1000, on dead wood, forest. ♀ Oct. 1009. Te Aroha, 1–2500, on dead wood, forest. ♀ Nov. 1045, 1062, 1042 *bis*.

Distrib. New Zealand.

Lepicolea scolopendra (Hook.) Dum. Rec. d'obs. 20, 1835.

Te Aroha, 3000, pendant from tree-trunks, forest. ♀ Nov. 1040.

Distrib. New Zealand. Auckland Islands. (Tasmania; Oceania and Asia.) Common throughout tropics.

Trichocolea lanata (Hook.) Nees, Hep. Eur. iii. 116, 1838.

Auckland, Nihotupu Hills, 1000, on dead wood and tree-ferns, forest. ♀ Oct. 1026.

Distrib. New Zealand, Not rare.

T. tomentella (Ehrh.) Dum. Comment. 113, 1823.

Auckland, Nihotupu Falls, 1000, pendant mass from tree-trunks, forest. ♀ Oct. 1008. Te Aroha, 1–2500, on dead wood and rocks, forest. ♀ Nov. 1043.

Distrib. Auckland Islands. Common everywhere.

Schistochila appendiculata (Hook.) Dum. Rec. d'obs. 15, 1835.

Auckland, Nihotupu Falls, 1000, pendant from trunks of trees, forest. ♀ Oct. 1000.

Distrib. New Zealand.

S. ciliata (Mitt.) Steph. Sp. Hep. iv. 87, 1909.

Auckland, Nihotupu Falls, 1000, trunks of trees, forest. ♂, ♀ Oct. 1004.

Distrib. New Zealand.

Balantiopsis rosea Berggr. N. Z. Hep. 43, 1898.

Te Aroha, 1000, on dead wood, forest. ♀ Nov. 1052.

Distrib. New Zealand.

ANTHEROTACEÆ.

Megaceros leptohymenius (Tayl.) Steph.

Te Aroha, summit of mountain, 3000, on dead wood, forest. ♀ Nov. 1047. Pipiriki, 800, on dripping soapstone bank, Wanganui River. Nov. 1070. Nelson, Maitai Valley, Fiddler's Elbow, 500, on rotten wood, mixed beech forest. ♀ Dec. 1072. Ray's Bush, 800, swampy ground. 1071.

Distrib. New Zealand.

Anthoceros giganteus Lehm. & Lindenb. in Gottsche Lindenb. & Nees, Syn. Hep. p. 588 (1846).

Paradise, slopes of Mt. Earnslaw, 2500, in stream, beech forest. ♀ Feb. 1170.

Distrib. New Zealand.

A. laminifer Steph.

Paradise, slopes of Mt. Earnslaw, 2000, rocky stream, beech forest. ♀ Feb. 1171.

Distrib. New Zealand.

NORFOLK NOTES.

By W. H. Burrell, F.L.S., and W. G. Clarke.

During the past three years several journeys have been made by us to West Norfolk to study the moss flora of that division of the county, and to see some of the rare flowering plants which make their home in the sand plains around Brandon and Thetford. A more detailed report is being submitted to the Norfolk and Norwich Naturalists' Society, but some of the notes may interest the wider circle of readers who can be reached through the *Journal of Botany*.

One enquiry uppermost in our thoughts was for *Sphagnum*. Bog moss is not plentiful in East Anglia, and as a rule it is absent from marshes communicating with the river systems. Exceptions at Horning in the Bure Valley; Honing and Sutton in the Ant Valley; at Calthorpe Broad; Lopham in the Waveney Valley; and Hinderclay in the Little Ouse Valley, where *Sphagnum* and *Chara* are associated, show that lime is tolerated under certain conditions, but our experience is that it rarely forms a conspicuous element in the vegetation except in small swampy areas which carry the drainage of decalcified gravels and loam. A typical instance in East Norfolk occurs at Horsford and Newton; the rivulets which originate in these and the adjoining parishes, and uniting at Spixworth Bridge find their way to the Bure at Wroxham, pass through six miles of meadows, swampy in places, where, so far as we have observed, *Sphagnum* does not occur; but in hollows on the adjoining heathland, a few feet above the level of the meadows, the peaty pools are filled and bordered with it. A parallel case in West Norfolk occurs on Roydon Common; the brown peat-stained water of the deeper pools carries masses of *Sphagnum cuspidatum* and members of the *subsecundum* group, while the shallow peat flashes are carpeted and bordered by many-hued cushions of most of the types which have been detected in the county. In a less conspicuous way *Sphagnum* occurs in v.-c. 28 at Pentney, West Acre, and Hockham, but such areas form a small proportion of the swampy wastes. The species noticed in West Norfolk were: *S. cymbifolium* Ehrh., *S. cymbifolium* var. *squarrosulum* Nees & Hornsch., *S. papillosum* Lindb., *S. rigidum* Schp., *S. tenellum* Ehrh., *S. subsecundum* var. *contortum* Schp., *S. inundatum* Warnst., *S. rufescens* Limpr., *S. squarrosum* Pers., *S. acutifolium* Ehrh., *S. acutifolium* var. *subnitens* Dixon, *S. fimbriatum* Wils., *S. intermedium* Hoffm., *S. cuspidatum* Ehrh. 1910 appears to have been a favourable year for spore production; including *S. rigidum*, which rarely fruits, the cushions in July were laden with capsules; two rare-fruiting hypna, *H. elodes* and *H. stramineum*, were also seen with capsules at Caldecote and West Acre respectively.

Other interesting bryophytes were: *Dicranum spurium* Hedw. at Grimston and *Metzgeria furcata* var. *æruginosa* Hook. at Narford, both new records for Watson's Ouse province; *Grimmia apocarpa*

Hedw. and *Orthotrichum anomalum* var. *saxatile* Milde occasionally on churchyard walls in very small tufts; *Orthotrichum pulchellum* Smith, at Narford; *Eurhynchium tenellum* Milde, at Narborough, and *Sphærocarpus terrestris* (Sm.).

Bearing in mind its European distribution, the prevalence of this last-named rare hepatic throughout the county is notable. It is fairly common in Italy and in the central and north-western provinces of France; Baden is the only German State which has produced it; it has been recorded from Sardinia, Teneriffe, England, and Ireland, but so sparingly that we might venture the opinion that in England, at the present time, Gloucestershire is the only county besides Norfolk where it could be found with ease. The Norfolk botanists of a century ago recorded it from Heydon, Holt, Norwich, and Yarmouth, but during the past few years we have traced it in more than fifty parishes from Sheringham and Ryburgh southwards to Loddon and Winfarthing; and from Upton, westwards to Swaffham, involving an area of more than five hundred square miles.

Mörckia is an interesting genus which has been added to Norfolk hepatics; during 1910 traces of it were seen in such widely separated parishes as Blo' Norton (v.-c. 28), Flordon, and Whitwell (v.-c. 27). It probably belongs to *M. Flotowiana*, but the habit of our marsh plant differs so much from the mat-like growth of the west coast that it seems advisable to keep it under observation before coming to a final decision.

Another group of plants which claimed special attention was the genus *Utricularia*. Bladderwort was an uncommon plant to us, as it is to many botanists, until opportunity allowed us in recent years to visit the low-lying districts of the county. *Utricularia vulgaris* occurs in incredible quantity in marsh pools; a single branch has been measured six feet in length, flower stalks up to fifteen inches; and the crackling of its tiny bladders when one wades amongst it is magnified by numbers into an audible sound. *U. minor* usually accompanies it. Some recently cleaned dykes in Feltwell Fen were carpeted over many square yards with a delicate lace-work of this species, which was in almost complete possession and showed up very prettily against a background of black peat.

We specially desired, however, to acquire field knowledge of *U. intermedia*; chance had put us on its track at Swannington in v.-c. 27 during the autumn of 1909, and having once recognized it, we found it to be by no means so uncommon as expected; a difference in habit possibly accounts for it being overlooked; it is not free-floating, like *vulgaris*, but anchors itself to the substratum by its bladder-bearing branches which are aphototropic, developing amongst the underlying moss and herbage, or even penetrating the soft mud, and are devoid of chlorophyll; only one example came to our notice of a plant with floating green bladders. We walked through hundreds of square yards of shallow pool at Roydon, treading on it at every step, its foliage forming a carpet without visible bladders suggestive of a miniature *Hottonia* rather than *Utricularia.* Hibernation is effected by winter buds, which often remain visible at the base of the new growth throughout the summer; one flower was seen.

Malaxis paludosa has been seen in Norfolk on several occasions since the latter part of the eighteenth century. Dawson Turner recorded it for Cawston Heath and Felthorpe Bog, in the *Botanist's Guide*, 1805. The *Norfolk Tour*, 1829, mentions Burgh Castle, near Yarmouth. *Flora Britannica* added Holt and Edgefield; Kirby Trimmer's *Flora*, 1866, added Stratton Strawless, and Miss Barnard found it at Roydon Fen in 1884, all the stations being in East Norfolk. There are so many suitable places, difficult of access, where it might flourish unseen, that it seemed an assured prize for diligent search, and we received our reward last July, when after a determined hunt covering three seasons we met with a colony in which we counted fifty plants. Half a dozen were minutely examined; the largest was six inches high, with twenty-two expanded flowers and eleven buds; the smallest four and a half inches high, with thirteen flowers and seven buds. Special attention was paid to the substratum; Sowerby said it was found growing in sphagnous bogs, and it is more or less generally accepted that *Malaxis* is epiphytic upon *Sphagnum.* It is worth noting that *Sphagnum* grows on nearly all the areas where *Malaxis* has been seen in Norfolk, but our plants in the west division were seated on *Hypnum stellatum* and *H. scorpioides*, and in no case were they associated with *Sphagnum.* It would seem that the same may apply to *Liparis*, as on the two occasions when we have seen it, it was in the neighbourhood of *Sphagnum* but *Hypnum* was the associated moss.

We had the good fortune to find a strong colony of *Veronica spicata* near Thetford, in v.-c. 28, extending the range of this handsome flower from Cambridge, Hampshire and Suffolk. Mr. Arthur Bennett has been good enough to confirm the identification, and he tells us that the old record for West Norfolk was an error, the specimen so named in the British Museum being *Veronica officinalis.* The spikes varied considerably—one in a sunny position was two and a half inches long, with flowers too dense and numerous to count accurately, but approximating to one hundred; another, growing in shade, was one and three quarters inch long with only thirty laxly-arranged flowers.

Artemisia campestris has been known in Norfolk since the third decade of the eighteenth century. Several strong colonies occur in West Suffolk, but it had not been seen north of the Little Ouse since 1885, and doubt had been expressed as to whether it still survived in Norfolk. We have carefully examined the Thetford and Blickling localities without success, but after several attempts, one of us (W. G. C.) refound it in its Cranwich station in August last, where, judging by its surroundings and its appearance, there is reason to hope it will maintain itself indefinitely.

Helianthemum Chamæcistus, *Silene Otites*, *Medicago falcata*, *M. minima*, and *Asperula cynanchica* were seen in many places; a single plant of *Achillea Ptarmica* was seen in Feltwell Fen;

large quantities of *Tillæa muscosa* line the heath tracks, forming conspicuous red streaks at certain seasons; it may be expected on any suitable area in both East and West Norfolk. *Oxycoccus quadripetala* and *Narthecium Ossifragum* made a great display at Roydon and Grimston. Junipers at Thompson were, we afterwards learned, introduced by the late Lord Walsingham; *Phleum phleoides* was seen in Rev. E. F. Linton's station near Thetford, and *Apera Spica-venti* in many places; miniature specimens of the last-named grass were taken at Santon, two and a half inches high; at Cressingham it was two feet high. We have seen it in great quantity as a weed of cultivation to the north of Norwich in recent years. A dwarf specimen of *Phegopteris calcarea* growing in a mortar-joint of a brick-built bridge in Santon, remote from dwellings, has been under observation for the past two years, and *Osmunda* was seen in two stations in West Norfolk.

Our attention has been arrested in almost every visit by the unusual prevalence of albinism; a large proportion of *Erodium cicutarium* in Breckland has white flowers and pale green stems; *Calamintha Acinos* persistently varies in this direction, and white flowers of *Galeopsis Ladanum*, *Erica Tetralix*, *Prunella vulgaris*, and *Pedicularis palustris* have been noted. At Castle Acre some tall clumps of *Echium vulgare* had the blue pigment suppressed, and looked unfamiliar with white flowers streaked with pink.

VEGETATIVE REPRODUCTION IN *SAGINA NODOSA*.

By W. G. Travis.

During the past winter I have had an opportunity of making some observations on the vegetative reproduction of this plant by the axillary buds or bulbils which it develops. In the present paper I propose not only to touch upon the principal points of interest which came under notice in regard to vegetative reproduction in this species, but to add a few remarks on the occurrence of the plant on the Lancashire coast and the ecological conditions under which it exists.

Sagina nodosa Fenzl. occurs plentifully in the moist hollows or "slacks" among the sand-hills of the Lancashire coast. It is one of the first few flowering-plants to colonise the new slacks. In these situations it is not only scattered in greater or lesser quantity all over the moist sandy ground, but forms conspicuous patches. The other pioneers with which it is associated are *Agrostis alba* vars., *Juncus articulatus* var. *nigritellus* and *J. bufonius*. A few other species occur also, but the four mentioned generally constitute, so far as phanerogams are concerned, the principal components of the florula. In these new slacks, where the plant association is an open one, *Sagina nodosa* has full scope for a time, but with the increase of vegetation, especially the extensive development of aquatic mosses in the moister portions of the slacks, it tends to become more restricted to the sloping margins at the foot of the dunes, where an interesting bryophytic plant-association occurs.

It will be recalled that in *S. nodosa* the main stem remains short, and bears numerous, comparatively long, subulate leaves, from the axils of which lateral flowering-stems are given off. In the leaf-axils of these lateral stems are developed fascicles of small leaves, which in due time drop off, and easily strike root if the conditions are favourable. These bulbils in my specimens measured 1–2 mm. long, and had three or four decussate pairs of short, plump, semi-terete leaves, generally tinged with purple. The parenchyma of these leaves consists of a dense mass of very chlorophyllose cells, full of reserve food material.

The first sign of the root is the appearance of a minute whitish protuberance immediately at or a little to one side of the extreme base of the lowest pair of leaves. The root rapidly grows and develops root-hairs. This primary root is soon followed in many cases by a second, also from the base of the lowest leaves, and, more rarely, by a third. Usually, only a single tap-root is developed. From the rapid deterioration of the lowest pair of bulbil leaves, it is evident that nearly the whole of the food material they contain goes to the development of the root system. In cases where the root had only attained a length of 2 mm., the lowest pair of leaves had already become yellow, thin, and flaccid. Subsequently to the appearance of the primary root or roots, one or two adventitious roots are frequently given off from the axils of the lowest leaves of the bulbil, and often attain nearly the same size as the main root. During the development of this root system the upper leaves of the bulbil doubtless function to some extent as true leaves. The leaves of the second pair lengthen and become less plump, and in the third pair this is particularly noticeable. During this development a slight lengthening of the internodes of the bulbil takes place. Above the uppermost pair of bulbil leaves, however, a very marked elongation of the main axis commences, the axis growing very considerably and carrying up the new leaves quite clear of the bulbil. In specimens which I strewed on moist dune-sand and kept under a hand-glass, the tap-roots appeared, in most cases, in a few days' time and grew rapidly, but, after that period of activity, development seemed to lag, and in a month's time (towards the end of December) typical specimens were only 5 mm. long (exclusive of roots), and bore a pair of young leaves still folded face to face.

In fresh material collected in the second week of January, it was found that the great majority of the bulbils had taken root, and in many cases they were as far advanced as those I had in cultivation. By the strong development of the tap-root the bulbil is eventually pulled down into the ground, and in plants sufficiently developed to show two or three pairs of young leaves the bulbils were below the surface of the soil, and the first and second pairs of bulbil leaves had almost decayed away.

As illustrating the number of bulbils which may be produced, I may mention that in one well-grown plant which I collected there were a dozen lateral branches, often pinnately branched, and some of these secondary branches bore as many as a dozen pairs of bulbils. The large quantity of bulbils produced was brought home to me by the following circumstance. In November some of the slacks were found to contain one or two feet of water. Under the influence of the wind, the detached bulbils had drifted towards the leeward side of the slack in dense masses, like duckweed at the side of a pond. This method of dispersal is a point of ecological interest which would not be likely to occur to an observer who only saw the slacks in a nearly dried-up condition at other times of the year. Whilst as a rule favouring the dispersal of the plant, this distribution by water is liable to prove prejudicial in circumstances such as those mentioned, where the abnormal depth of water carried the bulbils too far up on the sides of the dunes, and eventually left them stranded there. During the succeeding period of dry weather, these stranded plants were mostly buried by drifting sand from the side of the dunes, and practically all trace of the drifted masses of bulbils was obliterated. On making a careful search, I found some of the young plants with their uppermost leaves just showing above the sand, and on extracting them it was seen how lengthened they had become in their effort to keep above the sand. At this spot some of the parent plants were also exhumed, and found to have bulbils still in the axils of the leaves and striking root. In one such instance the bulbils and young plants developing from them were 15 mm. long. This continuance of the bulbils in position in the leaf-axils until they begin to root is very common.

On examining a number of older plants, I found in some cases that lateral branches originating in the axils of the radical leaves were thickened and swollen just below one of the nodes at a point some distance up the stem. Below this swollen portion the stem and its lower leaves were yellow and evidently dying away. In some instances an adventitious root had been put forth at one of the nodes at right angles to the plane of the leaves. Probably such branches ultimately separate from the parent plant, and develop into new plants. Cuttings of these branches were taken and strewn on moist sand. These soon rooted, adventitious rootlets developing from one or more of the lower nodes. These roots sprang, occasionally singly, but mostly in pairs, one at each side, either from the axils of the leaves or from the nodes of the stem and at right angles to the leaves.

Compound crystals of calcium oxalate occur in the leaves of all parts of the plant. In the bulbil leaves at a little distance from the nerve there is a broken irregular line of cells containing crystals. These crystals average 0·030 mm. in diameter, and, as the bulbil leaves get older, the crystals naturally become more numerous and rather larger.

The prevailing form of *S. nodosa* among the dunes is quite eglandular, and I have not seen the glandular form (*S. glandulosa*

Bess.). The plants, too, are smaller and more compact and fleshy than the inland form of this species. My notes are based entirely on material collected on the dunes near Freshfield, on the Lancashire coast.

TWO NEW PLANTS FROM HONGKONG.

By W. J. Tutcher, F.L.S.

Quercus (Chlamydobalanus) Elizabethæ, sp. n. *Arbor* 30–40 ped. alta. *Ramuli* juniores angulati, pubescentes. *Folia* petiolata, lanceolata, 3–6 poll. longa, $\frac{3}{4}$–$1\frac{1}{2}$ poll. lata, subcoriacea, glabra, integerrima, apice acuminata vel caudata, basi cuneata, supra subnitida, costa subplana, nervis primariis inconspicuis, infra vix pallidiora, costa elevata, nervis primariis lateralibus utrinque 12–16 intra margines curvatis anastomosentibus venis tenuibus vix elevatis; petioli 6 lin. longi, glabri. *Amenta* masculina desunt. *Spicæ* femininæ in axillis foliorum superiorum dispositæ, folia interdum superantes, erecto-patentes, foliis nunc multo breviores nunc subequales; pedunculi crassi, tomentosi, floribus in glomerulis trifloris dissitis; styli 3, erecti. *Fructus* secus pedunculum dense dispositi, juniores ternatim aggregati, 1–2 tantum maturantes. *Cupula* $1\frac{1}{4}$ poll. diam. 1 poll. longa, subglobosa, intus argenteo-sericea, extus subtiliter pubescens, brunnea, apice depressa; squamæ triangulares, apiculatæ, arcte adpressæ, demum concretæ, supremæ incurvæ, circiter 8-seriatæ. *Glans* subglobosa, circiter 9 lin. longa, castanea, glabra, apice valde depressa, basi truncata, concava.

Mt. Victoria north-west, Hongkong; and Taiwai, Hongkong New Territories, *Tutcher*, Hongkong herb., nos. 4616 and 9114.

This interesting species I have named after my wife, who has shared my island home in Hongkong for the last twenty years, and to whom I owe so much. It has the leaves of *Q. fenestrata* Roxb., which has also been found in Hongkong, and the fruit is somewhat similar to that of *Q. confragosa* King, from the drawing and description of that plant in the Ann. Bot. Gdns. Calcutta, ii. p. 77, t. 71. The young acorns, unlike those in the latter species, are completely enclosed by the cup at a very early stage, and are quite glabrous.

Amorphophallus Dunnii, sp. n. *Tuber* globosus, 2 poll. diam. *Folia* 12–18 poll. diam., glabra; petiolus 12 poll. longus; segmenta terminalia 2–3 poll. longa, $\frac{1}{2}$–$\frac{5}{8}$ poll. lata, lanceolata, caudata, inferiora minora. *Pedunculus* 9–10 poll. longus, levis. *Spatha* 5–6 poll. longa, cymbiformis, inferne convoluta, intus basi purpurascens, cetero flavo-viridis. *Spadix* stipitata, 4–$4\frac{1}{2}$ poll. longa; pars feminea 6 lin. longa, 3 lin. crassa, cylindrica; mascula 7 lin. longa, 6 lin. lata; appendix $2\frac{3}{4}$ poll. longa, fusiformis, crassa, acuta, ochroleuca. *Ovarium* 2-loculare, $\frac{1}{2}$ lin. longum, subglobosum.

Lantao Island, Hongkong New Territories, March, 1909, *Dunn*; plentiful in a ravine on the south slope of Mt. Parker, Hongkong, *Tutcher*, Hongkong herb., no. 9115.

I have pleasure in naming this after Mr. S. T. Dunn, who was Superintendent of the Botanical and Forestry Department, Hongkong, for seven years, and to whom I am indebted for much useful botanical knowledge.

SHORT NOTES.

CAREX HELODES Link AND OTHER SUFFOLK PLANTS.—In June last, with Dr. Moss, I motored through Suffolk. At Benacre (district 3), in a marsh which lies on both sides of the road were some interesting plants, which included **C. helodes*, a species not included in Hind's *Flora of Suffolk*. With it grew true *Orchis incarnata* L., the flesh-coloured plant, also a hybrid of this and its associate, *O. latifolia*, i. e. *O. Aschersoniana* Haussk.; *Spiræa Ulmaria* L. and the *var. *denudata* Boenn., as well as some intermediate forms; *Carex hirta* L., *C. Goodenowii* Gay *var. *chlorocarpa* Druce, and var. *recta* Aschers. & Graebn.; *C. inflata* Huds.; *C. acutiformis* Ehrh. var. *spadicea* (Roth), also occurred. In sainfoin fields, *Bromus interruptus* Druce was abundant near Hadleigh (2), Saxmundham (4), and at Woodbridge (5). **B. leptostachys* Pers. grew near Benacre (3). *Potamogeton alpinus* Balb. at Needham Market (5). *Crepis taraxacifolia* Thuill., common as at Sudbury (2), Lowestoft (3), Woodbridge (5). At Aldeburgh, *Ranunculus Baudotii* Godr., *Zannichellia maritima* Nolte, *Sagina maritima* Don; a hairy form of *Lotus corniculatus* L., which comes under the *var. *incanus* Gray, appeared to be the prevailing plant. Presumed new records to the *Flora* are asterisked.—G. CLARIDGE DRUCE.

SWARTZIA INCLINATA Ehrh. ON THE LANCASHIRE DUNES. — The similarity between the moss-flora of the Lancashire sand-dunes and that of such localities as Tents Muir, Fife, or the Sands of Barrie, Dundee, has long been familiar to bryologists. It requires something more than chance to account for the presence, in areas so widely separated, of such rarities as *Bryum Marrattii*, *B. calophyllum*, *B. Warneum*, *B. neodamense*, *Catoscopium nigritum*, *Hypnum Wilsoni*, and *H. lycopodioides*. To these may now be added *Swartzia inclinata*, which I found in the second week of June, fruiting freely and in good quantity, scattered over several yards of ground, in one place on the sand-dunes near Freshfield. From all appearances it must have existed there for many years, and it is singular that it has so long escaped observation. It has previously been found in South Lancashire (*vide* Journ. Bot. 1908, p. 123), in an inland station. It was in very small quantity, and caused some speculation as to its probable origin. Its discovery in greater quantities on the shore lends some probability to the idea that in the Rainford Moss station (which was on the margin of a small pool) it may have been accidentally introduced by aquatic birds from Freshfield. On the other hand, the occurrence at Rainford of several species of both flowering plants and bryophytes, which with us are otherwise restricted to the sand-dune tract, would also suggest as an alternative view that this remnant of sandy marsh at Rainford may be a survival of a more extensive area, in which the conditions were similar to those at present existing on the dunes.—J. A. WHELDON.

LIMONIUM IN DENBIGHSHIRE.—In correcting one error (p. 234) I fell into another when stating that the Denbighshire records erroneously ascribed to *Limonium bellidifolium* "must be read as referring to *L. vulgare*." This should have read *L. occidentale*. The matter will be best rectified if I restate the Denbighshire distribution and records of all the species of the genus:—*Limonium vulgare* Mill. (= *Statice Limonium* L.). On the beach close to Llandudno Junction, *Fl. Angl. & Carn.* Along the strip of salt marsh, and on the adjoining stone embankment and rocks, extending from Llandudno Junction to a mile or so above Glen Conway, *Miss F. M. Thomas*. It occurs in some quantity hereabouts.—*L. occidentale* O. Kuntze (= *S. binervosa* G. E. Sm.). The various old records of "*Statice spathulata*" and "*S. reticulata*," all within a fairly restricted area of the Creuddyn Peninsula, must be placed here. Sea beach south of Llandudno, *N. J. Winch* (*Mag. Nat. Hist.*). Llandudno, *G. Howitt* (sp.) (*N. B. G.*). Rocks by the Orme, *Rev. W. W. How.* On the sea beach of Llandudno, below Ty draw, near the place where the ore is deposited, *Hist. Abercon.* A tall form on inaccessible cliffs of Great Orme's Head, particularly on north-east side, and a dwarf form on greensand of beach, Conway Bay, in front of the Dean of York's house, on western side of Great Orme. In a year or two the latter locality will be built over, *C. Bailey* (*B. Rec. Cl. Rep.* 1874). This last record includes the form which has been described as *β intermedium* Druce. A species to be looked for along the Conway estuary is *Limonium humile* Mill. (= *S. rariflora* Drej.); this is as yet unrecorded for the county. —A. A. DALLMAN.

CIRSIUM SETOSUM M.B.—This year and, as I am informed, last year also this very remarkable variety of *C. arvense* has been observed growing on the bank of a recently widened lane in the outskirts of Newport, Isle of Wight. There were a considerable number of plants in April this year, and the rosettes of root-leaves appeared unlike any British plant with which I was acquainted. As the plants grew up to a height of from four to six feet, they still looked strangers to me, not in the least suggesting any relationship to *C. arvense*. I had then never seen *Senecio saracenicus* growing, but I thought my tall plants must be much like that species. The flowers are undoubtedly similar to those of *C. arvense*, but in no other respect does *C. setosum* agree with *C. arvense*, and in the flowers I find some distinct differences. The flower-heads of *C. setosum* are more suddenly contracted into the stalk than are those of *arvense*. The lobes of the style cohere, whilst those of *arvense* are divergent. The pappus is one third longer in *setosum* than in *arvense*. Is not our plant fairly entitled to rank as a species?—FREDC. STRATTON.

POTAMOGETON COLORATUS Hornem. IN SOUTH LINCOLN AND NORTHANTS.—Two years ago I found this species in small quantity in a fen-ditch in the parish of Eye, Northants, for which county it was a new record. Last year I spent some time in investigating the flora of these fen-ditches, when I found it in the same parish in two different localities. This year it has spread from the spot where I first saw it, and is now very abundant for many yards. I also found a small patch (as a mud form) on Sutton Heath, near Wansford. In a ditch between Eye and Crowland, in South Lincoln, it was also plentiful this year, and is an addition to *Topographical Botany* for that vice-county; here it was associated with *Myriophyllum alterniflorum*.—G. CLARIDGE DRUCE.

SUSSEX ORCHIDS. — Two rather remarkable discoveries of Orchids have been made recently in East Sussex. A single specimen of *Orchis purpurea* has been found in the Ouse district, near Lewes, by Mr. Herbert Jenner; there is no previous record for East Sussex. Of *O. hircina*, a single specimen has been found in the Cuckmere district, near Eastbourne, by Mr. E. J. Bedford. Of this also there is no previous record for East Sussex, the only record for Sussex at all being, I believe, a recent one on the extreme west of the county. The chief interest in these discoveries lies in the fact that the districts have been well worked by competent botanists for more than a century, so that these and other species may still occur sporadically over a large extent of the down-land.—J. H. A. JENNER.

SENECIO SARACENICUS L.—This plant is still growing in fair abundance by the stream at Ashford in the parish of Steep, near Petersfield, Hants, where I saw it, not quite in flower, on July 17th. (See the note p. 241, Townsend's *Flora of Hampshire*, 2nd edition.) —FREDC. STRATTON.

VIOLA CURTISII.—I cannot find that *Viola Curtisii* is on record for v.-c. 95 Elgin; a specimen of this exists in the Herbarium of the Holmesdale Natural History Club, Reigate, labelled: "Dunphail, 1850. Hb. J. A. Power."—C. E. SALMON.

FILAGO SPATHULATA Presl. IN JERSEY.—In 1910 I brought back from Jersey a young *Filago* which grew near St. Aubins; it has since flowered, and proves to be *F. spathulata*, hitherto, I believe, unrecorded for the Channel Isles.—G. CLARIDGE DRUCE.

REVIEWS.

Prodrome de la Flore Corse. Par JOHN BRIQUET. Tome i. 8vo, pp. lvi, 656. Geneva: Georg & Co. 1910. Price 15 fr.

DR. BRIQUET'S exhaustive work on the Flora of Corsica comprises the results of six botanical journeys made during the last ten years under the auspices of M. Émile Burnat. The first volume contains some introductory matter, including a *résumé* of the itinerary on the various journeys, followed by a bibliography of Corsican botany, containing one hundred and fifty-eight items, and a list of twelve exsiccata. The remainder of the volume is occupied with a critical list of the vascular plants, arranged according to Dr. Engler's system, and including the Ferns, Monocotyledons, and Dicotyledons to the end of *Lauraceæ*. The second volume will, it is hoped, conclude the *Archichlamydeæ*, and deal with part of the *Metachlamydeæ*, while volume iii. will complete the *Metachlamydeæ*, and contain besides a general index, a geobotanical account of the island, a history of its botany, and a geographical index. It goes without saying that the author has followed the International Rules of Nomenclature, in the revision of which, in 1905, he played so important a part, and in the course of his work will be found valuable notes on the nomenclature of certain genera and species. Among others, reference may be made to the restoration of *Nymphæa* and *Nuphar* in the sense in which they were until recent years generally used. Dr. Briquet shows that there is no ground for the displacement of *Nymphæa* by Salisbury's *Castalia*, and the inversion of *Nuphar* and *Nymphæa*. Salisbury, when establishing *Castalia*, adopted it for the larger section of the original genus, and used the original Linnean name *Nymphæa* for the smaller section, thus unconsciously breaking the rule that, other things being equal, the original name, when a genus is divided, must be kept for the part which contains the greater number of species.

A less welcome change is the replacement of the name *Silene Cucubalus* Wibel (the old *S. inflata* Sm.) by *S. angustifolia* Guss. In our *List of British Seed Plants and Ferns*, Mr. Britten and I adopted the trivial *latifolia* for this species, following Miller (*Dict. Gard.* ed. 8), who established three species, *Cucubalus Behen*, *C. latifolius*, and *C. angustifolius*, the two former synonymous with the typical *Silene Cucubalus*, and the last with a narrow-leaved variety, the var. *angustifolia* DC. As the name *Silene Behen* was already occupied, we adopted the binominal *S. latifolia*, overlooking the fact that Gussone had previously (in 1827) described the narrow-leaved plant as a distinct species in his *Flor. Sicul. Prodr.* (i. 500). As it seems generally agreed that this peculiar narrow-leaved form must be included in the larger species, the name for the aggregate must be *S. angustifolia*, however inappropriate this may be for our British plant.

Reference may also be made to one other small point in nomenclature, namely, the method of writing double-barreled species-names, such as *Alisma Plantago-aquatica*; Dr. Briquet writes these as three words, though in the text of the Rules a hyphen is inserted between the two parts of this trivial. This is certainly preferable; the binominal system is one to be maintained as intact as possible, and we have more than once expressed regret at the trinominals used by some authors by suppressing the term *var.* between the name of a species and its variety.

But these are matters somewhat apart from Briquet's carefully elaborated and critical study of the Corsican flora, for which the term "Prodromus" seems scarcely adequate. Synonymy and the distribution of the species, subspecies, and varieties have been carefully worked out, and critical notes are frequent. It is to be hoped that nothing will occur to hinder the completion of the work, which should form a valuable addition to the literature on the botany of the Mediterranean region.

A. B. R.

Bref och skrifvelser af och till Carl von Linné; med understöd af Svenska Staten utgifna af Upsala Universitet. Första Afdelningen. Del v. Stockholm (Aktiebolaget Ljus), 1911, pp. 366.

The issue of this important series continues to progress steadily; our notice of the previous volume will be found in this Journal for November, 1910, pp. 290–293. That volume was entirely devoted to the correspondence between Linné and his most intimate friend, Archiater Bäck; in the fifth volume, now before us, we have the conclusion of that interchange of letters from 1756 till 1776.

The same unstudied familiarity is found in these later letters as those which went before them. We have such cases as where Linné laments the death of his skilful gardener, Dietrich Nietzel, with his extreme anxiety to get a good man in his place, lest the value of the academic garden should be lessened or lost. He chats about many things uppermost in his mind at the time of writing, such as the career of Hasselquist and the fate of his collections, his delight in getting Patrick Browne's plants, and his surprise that the English should have allowed so great a treasure to escape them, at so small a cost. The estates of Hammarby and Säfja are bought, he himself has had the Upsala fever, he narrates the symptoms of approaching sickness, also the formation of a Siberian garden at Hammarby, as those plants will stand the winter's cold (a garden still existing and glorious in May with the yellow flowers of *Corydalis nobilis*), his delight at being painted by Roslin for nothing, a plan of his museum on the little height behind his house which shows how he there arranged his treasures, and the pathetic last letter of all, written on December 5th, 1776, on the death of Bäck's sole surviving son, but which did not reach Bäck till the writer was dead himself.

Two-thirds of the volume are taken up with these freely-written notes, and the remainder of the pages contains the correspondence from those friends whose names begin with the letters C or D, such as Celsius, both Anders and Olof, friends and benefactors of Linné during his student life, the entomologists Clerck and De Geer, and Dalin the historian. We have also a memorandum to Count Gustaf Cronhjelm, the Chancellor, undated and unsigned, but attributed by the editor to the spring of 1733, which recounts not only his early writings, but his plans for even the *Species Plantarum*, which was not accomplished till twenty years later.

This notice may close with the following extract from a letter of De Geer from Leufsta, dated October 16th, 1772:—

"A short time since my son [Emanuel] wrote to me from London, that Solander during his voyage got over 1000 new plants, as well as several packages of special animals in spirit. He thought that the Archiater [Linné] should be invited to travel to London without expense, to inspect and describe all these rarities. It would be highly desirable if the Archiater's years would permit of such a journey, as it would be of the greatest value to all lovers of Nature, for no so eminent a judge exists in the world, as the Archiater is."

B. D. J.

Two Books on Lichens.

The Lichens of Minnesota. By Bruce Fink. Pp. xvii, 269, 51 pl. 18 figs. Washington, 1910.

Die Brandpilze der Schweiz. By Prof. Dr. H. C. Schellenberg. Pp. xlv, 180, 79 figs. Price, 6 m. 40 pfg. Bern, 1911.

Mr. Bruce Fink has been engaged for many years in the study of Minnesota Lichens, both in the field and in the laboratory, and papers embodying the results of his observations have appeared from time to time in the *Minnesota Botanical Studies* and in the *Bryologist.* The volume before us furnishes the complete record of his work.

A clear and succinct account is given in the Introduction of Lichens in general, their morphology and physiology, their distribution and economic uses. The principal part of the work is systematic, and is prefaced by a descriptive catalogue or outline of classification, largely based on accepted modern methods. The different orders and families are described, and the catalogue is followed by an artificial key to the genera, which should prove helpful to students in determining the position of their plants in the scheme of classification. With each genus is given a key to the species.

The author has successfully avoided too great technicality in his diagnoses of species; he claims merit for being the only writer who gives size of thallus, podetia, &c., but when one turns to the details and finds that certain podetia may be anything between 3 mm. and 30 mm. in height, or, as in another case, from 25 mm. to 90 mm., one wonders where exactness comes in. The crustaceous lichens are equally variable, and measure, say, 10 or 15 mm. to 60 mm. in diameter. A form such as *Lecanora tartarea*, which may spread for feet, if not for yards, is left unmeasured. The old vague terms of "effuse," "widely spreading," &c., seem to fit the requirements of lichens sufficiently well, though to beginners in the study these measurements may be of assistance.

Lichens have a wide distribution, many genera and species occurring in all countries where similar conditions prevail, and *Minnesota Lichens*, as the author surmises, should prove a useful text-book for a wide region in North America from the Atlantic to the Pacific. It has been received in our country with very great interest, as many of the species are familiar to our lichenologists. The record even for Minnesota, however, must surely be far from complete; *Opegrapha* is represented by only two species, the large genus *Lecidea* by twenty-nine. There must be much work still for field students.

The plates illustrating the work are reproduced from photographs, but, though good in themselves, they generally miss just the specific points that are necessary for purposes of identification; as illustrations of the text they are not without value. Mr. Bruce Fink has earned the gratitude of lichenologists by this fine contribution to a somewhat neglected branch of botanical study.

Dr. Schellenberg's volume, containing a complete record of the Smuts of Switzerland, forms part of a larger cryptogamic flora. The preface gives a historic sketch of the study, the distribution and natural history of this group of fungi, all of them parasites, and some of them causing widespread diseases of cereals. They are divided into two families, *Ustilaginaceæ* and *Tilletiaceæ*; keys are given to the genera. With each species there is published an account of infection experiments, germination of spores, &c., and copious figures are provided of infected plants, spores, and germination stages. A list of host-plants, a bibliography, and a good index complete a very full and interesting account of these smut fungi.

A. L. S.

BOOKNOTES, NEWS, &c.

The last issue (July 4) of the *Journal of the Linnean Society* (Botany) contains a paper "On the Flora of the Falkland Islands," by Mr. C. H. Wright; an enumeration of Chinese Ferns, by Dr. C. G. Matthew; and a revision of the genus *Actinidia*, by Mr. S. T. Dunn. The first is based on a collection made by Mr. Vallentin; there are a few prefatory remarks, from which we learn that the Tussac Grass (*Poa flabellata*) is being rapidly exterminated through the ravages of cattle, and that *Primula magellanica*, since the introduction of sheep, has decreased in height and in the size of its flowers.

Mr. Nathaniel Colgan contributes to vol. xxxi. of the *Proceedings of the Royal Irish Academy* a paper on the Gaelic Plant and Animal-Names, and the folklore associated with them, of Clare Island. They were collected from the country folk and fishermen of the island in 1909 and 1910, none being admitted which have not been obtained "in the field." The list is prefaced by an interesting essay on various points connected with the names and their origin.

Going about the Country with your Eyes open, by Owen Jones and Marcus Woodward (Pearson, 1*s.* net), is a volume of the "Scout Library" and is mainly concerned with matters connected with "Scout" life and with animals of sorts. There is however a useful chapter on "How to know the Trees," and a practical one on "Some Uses of the Hazel and Ash."

SOMERSET PLANTS: NOTES FOR 1909–10.

By the Rev. E. S. Marshall, M.A., F.L.S.

These collecting-seasons having been ungenial, opportunities for field-work were considerably curtailed. Much, however, has been accomplished in the north-western part of the county, in preparation for the forthcoming second edition of the *Flora of the Bristol Coalfield*; and in a recent pamphlet Mr. J. W. White has compiled an excellent "Sketch of a Year's Work." Among plants apparently quite new for Somerset he mentions *Chara contraria* Kuetz., *Cratægus Oxyacantha* (*monogyna* Jacq.) var. *splendens* Druce, and *Carex elata* All. (*stricta* Good.). Mr. H. W. Pugsley sends me a short list from the neighbourhood of Minehead, and Mr. White has kindly handed on some useful notes made by Dr. C. E. Moss near Bruton, as well as on the peat moor and the Mendips. A walk with Major Wolley-Dod at Minehead yielded a few critical Roses, and a ramble round Chard Reservoir with Mr. W. A. Shoolbred somewhat increased our knowledge of its rich and interesting vegetation; I have also been fortunate in finding a few things elsewhere which are either new or rare. Fresh vice-comital records are starred; districts 1 to 4 being in Watson's v.-c. 5 S. Somerset, the rest (so far as this paper is concerned) in 6 N. Somerset.

Ranunculus Baudotii Godr. 4. Chard Reservoir, in profusion; a very uncommon plant, inland. I suspect that seeds of this and other submaritime species which occur there may have been brought from the coast on the feet of ducks or other water-fowl.—*R. Lenormandi* F. Schultz. 2. Crowcombe Heathfield, in small quantity.—*R. sceleratus* L. 3. Wiveliscombe.—*R. auricomus* L. 3. Hatch Beauchamp.—*R. sardous* Crantz. 2. Alcombe marshes, *Pugsley*.

Aconitum Napellus L. 8. "In great abundance in Park Wood, Redlynch; in June, 1902, there were thousands of flowering spikes. . . . Near Cole—Bruton—as a stream-side plant, with *Senecio sarracenicus*," *Moss*.

Papaver Rhœas L. var. **strigosum* (Boenn.). 2. Field at Alcombe, with the type, *Pugsley*. I know of no previous record for Somerset.

Meconopsis cambrica Vig. 1. A frequent ornament of the banks of the Exe, about Exton and Winsford.

Fumaria Boræi Jord. 2. Dunster; Wootton Courtney, *Pugsley*.—Var. *serotina* Clavaud. 2. Alcombe, *Pugsley*. — *F. Bastardi* Bor. (*confusa* Jord.). 2. Dunster, *Pugsley*.

Radicula sylvestris Druce. 9. Banks of the Cheddar stream, Hythe, *Moss*. — *R. palustris* Moench. 9. Rhine banks, Kenn Moor, *Moss*. — *R. amphibia* Druce. 3. Abundant in a ditch near the Tone, Creech St. Michael.

Cardamine impatiens L. 9. Foot of Callow Rocks, *Moss*.

Draba muralis L. 8. Railway bank near Pink Wood, between Bruton and Witham Friary, *Moss*.

Brassica nigra Koch. 3. Hatch Beauchamp.

Diplotaxis muralis DC. 9. Garden weed, Cheddar, *Moss.*

Coronopus didymus Sm. 8. Railway, Edington, *Moss.*

Lepidium heterophyllum Benth. var. *canescens* Gren. & Godr. (*L. Smithii* Hook.). 1. Frequent near Winsford.

Hutchinsia petræa Br. 9. I suspect that Hudson's Uphill record was right; it has probably been exterminated by quarrying. A careful search at Cheddar, early in the year, would probably result in the confirmation of this, as has been the case with several other species noted by J. C. Collins.

Viola sylvestris Kit. forma **leucantha* G. Beck. 5. Borders of Somerton Wood; very scarce. New for Somerset, I think. — *V. canina* Fr. 8. Heathy pastures at the source of the River Brue, *Moss.*—**V. lactea* Sm. 2. I am now able to claim this definitely as a Somerset plant; it occurs close to the railway station at Crowcombe Heathfield in fair quantity, and a few roots of **V. lactea* × *Riviniana* grow there with the parents.

Polygala serpyllacea Weihe. 1. Common near Winsford.—*P. calcarea* F. Schultz. 9. Oolitic hillside between Combe Hay and Bath, *J. W. White* sp. 10. Dr. Moss points out that the station at Long Knoll, Maiden Bradley, is—as I had supposed—in Wilts, as the county boundaries now stand.

Silene maritima With. 8. Sandhills, Burnham, *Moss.*

Lychnis Githago Scop. 8. Very rare near Bruton—only at Collinghayes Farm, *Moss.*

Stellaria aquatica Scop. 3. Wiveliscombe.

Arenaria verna L. 9. Rocky pasture at the extreme north-east of Cheddar Gorge, *Moss.*—*A. tenuifolia* L. 8. Great Western Railway, between Bruton and Castle Cary; also abundant on a roadside wall-top at Dunslade Farm, Bruton, *Moss.*

**Spergula sativa* Boenn. 1. Cultivated ground near Winsford, the first notice of this segregate in Somerset; the other records for aggregate *S. arvensis* L. have been referred to *S. vulgaris* Boenn., which is certainly the predominant plant in the county.

Montia fontana L. 1. Winsford. Under the var. *major* All. (*M. rivularis* Gmel.); only seen in flower, so I cannot say if it belongs to *M. lamprosperma* Cham.

Hypericum Androsæmum L. 9. Between Cheddar Wood and the Gorge; very local.

Geranium versicolor L. 2. By a stream at Alcombe, *Pugsley*; Murray records it as an escape at Porlock, &c.

Genista tinctoria L. 2. Very plentiful on a clayey common and elsewhere, north-east of Stogumber. 4. Near Chard Reservoir.

Ulex minor Roth (*nanus* Forst.). 2. Crowcombe Heathfield.

Trifolium hybridum L. var. *elegans* (Savi). 3. Among rushes on Holme Moor, near Wiveliscombe; its presence in this undrained marsh, and in marshes near the Teign between Teignmouth and Newton Abbot, South Devon, where Major Wolley-Dod and I found it in 1909, is difficult to account for, as it is usually a relic of cultivation in arable land.

Vicia sylvatica L. 9. Cheddar Wood, *Moss.*—*V. angustifolia* L. 1. Winsford.

Lathyrus sylvestris L. 3. Wood between Wrantage and Hatch Beauchamp. — *L. montanus* Bernh. 8. Cogley Wood, Bruton; "very rare on the Jurassic soils," *Moss.*

Prunus Cerasus L. 3. Woods between Wrantage and Hatch Beauchamp; I am inclined to think it native here.

Rubus corylifolius × *rusticanus*. 3. Milverton.

Geum rivale L. 1. By the Exe about Exton and Winsford, fairly common; *G. rivale* × *urbanum* (*intermedium* Ehrh.) was gathered about two miles above Winsford, with the parents.

Potentilla verna L. 9. Found independently by Dr. Moss and myself on hillsides between Axbridge and Cheddar Wood; I saw one plant in good flower on March 7th, 1910—remarkably early, as it was a backward spring.

Alchemilla minor Huds., *Fl. Anglica*, ed. i. (*A. filicaulis* Buser, *pro parte*). 9. Hill pastures above Cheddar Wood, *Moss.*

Rosa Sherardi Davies (*subglobosa* Sm.). 2. Minehead. — **R. scabriuscula* Sm. 2. Wooded coast towards Greenaleigh, Minehead. — *R. canina* L. var. *senticosa* auct. angl. (non Ach.). 2. Roadside, North Hill, Minehead. The true name for our plant is still uncertain.

Ribes nigrum L. 1. By the Exe, Winsford.

Cotyledon Umbilicus L. 1. Abundant about Exton and Winsford.

Sedum Telephium L. 7. Pen Pots, Penselwood, on Greensand; also in a hedge, Witham Friary (district 10), on Oxford Clay, *Moss.*

Drosera rotundifolia L. 3. Moors near Wiveliscombe.

Myriophyllum alterniflorum DC. 1. Abundant in the upper Exe and tributary streams.

Callitriche intermedia Hoffm. (*hamulata* Kuetz.). 3. Ditches about Creech St. Michael and Ham.

Peplis Portula L. 9. Blackdown, *Moss.*

Epilobium angustifolium L. 1. Between Brushford and Exton. 5. Somerton Wood.—*E. roseum* Schreb. 2. Lane at Alcombe, *Pugsley.* — *E. obscurum* × *parviflorum*. 3. Streamlet between Wiveliscombe and Milverton.

Œnanthe Lachenalii C. Gmel. 4. Damp meadows near Chard Reservoir.

Galium uliginosum L. 3. Moors near Wiveliscombe; locally plentiful.

Valeriana dioica L. 2. Between Crowcombe Heathfield and Stogumber. — *V. officinalis* L. (α *Mikanii* Syme). 8. "*The* form on the Jurassic soils" (*i.e.* around Bruton), *Moss.* I agree with Mr. Beeby in considering it to be specifically distinct from *V. sambucifolia* Mikan which is fairly common on non-calcareous soils in most parts of the county that I have visited.

Dipsacus pilosus L. 8. Cogley Wood, Bruton, *Moss.*

Erigeron acre L. 3. On sandstone near Milverton Station.

Anthemis nobilis L. 1. Exe Valley, about two miles above Winsford.

Artemisia Absinthium L. 2. Alcombe, *Pugsley.*

Petasites ovatus Hill (*officinalis* Moench). 1. Exton; Winsford.

Senecio viscosus L. 8. Railway track between Bruton and Castle Cary, *Moss*; doubtless introduced with ballast.

Cnicus eriophorus Roth. 8. Bruton, *Moss*; he remarks that it is much finer here than in Cambridgeshire.—*C. pratensis* Willd. 2. Crowcombe Heathfield. 3. Moors near Wiveliscombe. 8. Old pastures on the Oxford Clay between Bruton and Kingswood Warren, *Moss.*

Serratula tinctoria L. Red Hill, above Wrantage.

Picris hieracioides L. 2. Tivington, *Pugsley.*—*P. echioides* L. 3. West Hatch.

Crepis taraxacifolia Thuill. 3. Monkton Heathfield; walls, Creech St. Michael. 8. Common in hedges and arable fields near Bruton, *Moss.*

Hieracium maculatum Sm. 9. Cheddar Gorge, on rocky limestone *débris*: "two vigorous plants, bearing all the appearance of a native: indeed, the specimens I saw *could* not have been planted." Rev. A. Ley *in litt.*, July, 1909. As this species has been found truly wild by him and Rev. W. R. Linton on the same formation in Yorkshire, it is very probable that these had been seeded down from the upper cliffs, which he had not time to explore. Its occurrence here is parallel to that of *H. rubiginosum*; he could not see *H. maculatum* in any of the village gardens, nor has anyone else observed it there. — *H. umbellatum* L. 3. Lane at Coombe, near West Monkton.

Taraxacum lævigatum DC. (*obliquum* Jord.). 2. Plenty on Minehead Warren, *E. W. Hunnybun.*

Jasione montana L. 1. Hedgebanks, &c., about Winsford; abundant.

Wahlenbergia hederacea Reichb. 1. Winsford. 7. About Penselwood. 8. Kingswood Warren and woods above, *Moss.*

Oxycoccus quadripetala Gilib. Seen in fruit between Ashcott and Shapwick, August, 1903, *Moss*; still there in 1906!, though both it and *Andromeda* are threatened by turf-cutting.

Lysimachia Nummularia L.; *L. nemorum* L. 3. About West Hatch and Hatch Beauchamp.

Anagallis fœmina Mill. (*cœrulea* Schreb.). 5. With *Althæa hirsuta* in an open, stony pasture, Copley Wood, between Somerton and Butleigh, 1902, *Moss*; specially noted as *not* being "a blue-flowered *A. arvensis.*"—*A. tenella* L. 3. Near Wiveliscombe. 4. Swamp at the south end of Chard Reservoir.

Gentiana campestris L. "I have not seen this in the county. Murray's station [Bradley Knoll, near Kilmington] is now in Wilts; but I could only find *G. Amarella* and its var. *præcox* in this station," *Moss in litt.* It is quite possible that *G. baltica* Murb. may yet be found in Somerset, though it is usually a coast-plant; but I altogether distrust the records for restricted *G. campestris* in the south, and suspect that the alleged inland stations really belong to *G. lingulata* var. *præcox*, which I know well, and consider quite distinct from *G. Amarella*, with which it is usually associated.

Myosotis cespitosa Schultz. 4. Near Chard.

Cuscuta Epithymum Murr. 8. Godminster, and the Ridge, near Bruton, *Moss*.

Verbascum Blattaria L. 2. Several plants in a field at Minehead, *Pugsley*.

Linaria minor Desf. 8. Creech Hill, Bruton; also on the Great Western Railway in districts 8, 9, and 10, *Moss*.

Veronica montana L. 3. Woods between Wrantage and Hatch Beauchamp.

**Euphrasia stricta* Host. "Luxuriant and typical on a hillside at Bossington, 1910," *Pugsley*. New for Somerset.

Pedicularis palustris L. 3. Wet moors near Wiveliscombe.

Melampyrum pratense L. 2. Stogumber; typical.

Orobanche minor Sm. 3. Cloverfield, West Monkton, 1910; introduced.

**Mentha pubescens* Willd. (*M. aquatica* × *longifolia*). 2. Stream at Alcombe, 1910, *Pugsley*. New for Somerset.—*M. spicata* L. (*viridis* L.). 9. Cheddar; alien, *Moss*.—*M. piperita* L. 2. Alcombe, *Pugsley*.—*M. aquatica* × *arvensis* (*sativa* L.). 3. Near Wiveliscombe.

Lycopus europæus L. 4. Chard Reservoir.

Melissa officinalis L. 2. Abundant by a roadside near Selworthy; copse at Bossington, *Pugsley*. 3. Roadside between Milverton and Bathealton; West Hatch.

Salvia Verbenaca L. (auct. angl.). 2. Dunster Churchyard, *Pugsley*.

Scutellaria minor Huds. 8. Source of the Brue, Kingswood Warren, *Moss*.

Marrubium vulgare L. 8, 9. "On practically all the mountain Limestone 'downs' on the Mendips; also on the dunes—more like a casual, here," *Moss*.

Stachys palustris × *sylvatica* (*S. ambigua* Sm.). 9. Cornfields, Cheddar, *Moss*.

Lamium Galeobdolon Crantz. 1. Winsford.

Chenopodium glaucum* L. 9. Brean Down Farm, by the gate that leads from the farmhouse to the ferry; and on the shingle by the beach, *Moss*. This plant was found a good many years ago, and was thought to be *C. glaucum* by Mr. C. Crossland, of Halifax, though it was too young to show the fruit-character well. The foliage alone serves to distinguish *glaucum* at a glance from our other species, but it seems, as annuals often do, to have at least temporarily disappeared. Mr. White and I made careful independent search, last September, without success; the only Goosefoot which I could detect was a very small quantity of *C. album* var. *viride*, which could not possibly have been mistaken for it. New for Somerset; but further confirmation is evidently desirable.—C. Vulvaria* L. 2. Minehead Warren, 1910, *Pugsley*. Not previously found south of Bridgewater Bay.—*C. murale* L. 2. Near Dunster Station, *Pugsley*. Fine and plentiful near the entrance to Minehead Warren, 1910, as well as in Murray's station. On the muddy shore of an adjoining pond grew plenty of *C. rubrum* L. var. *pseudobotryoides* Wats.; the type occurred close by.

Salicornia ramosissima Woods. 2. Minehead, towards Greenaleigh. 9. In profusion near the ferry, Brean.—*S. appressa* Dum. 2. Minehead, with *ramosissima*; I also gathered several plants which I strongly suspect to be hybrids between them.

Polygonum Bistorta L. 4. Several plants were seen in flower, last June, near the railway between Chard and Ilminster.

Rumex crispus × *obtusifolius* (*R. acutus* L.). 9. Bleadon.

Daphne Laureola L. 2. Between Stogumber and Crowcombe Heathfield; also very fine and plentiful on the steep wooded bank below Stogumber Station. 3. One bush, roadside bank on Sidbrook Hill, West Monkton.

Viscum album L. 3. West Hatch. 5, 8. "Distribution interesting; *e.g.* absent around Bruton, except on river alluvium from Castle Cary down to the levels," *Moss*. In the case of this tree-parasite one would not expect soil to make much difference; so this may, perhaps, be merely accidental. 9. Flax Bourton, on *Robinia*, *Moss*. A favourite host-plant; several of these trees are full of Mistletoe at West Monkton.

Mercurialis annua L. var. **ambigua* (L. fil.). 2. Several fine plants, growing with the type in waste ground near the sea, on the Greenaleigh side of Minehead Pier, 1910. New for Somerset.

Ulmus glabra Huds. (*montana* Stokes). 1. Woods about Winsford; apparently native.

Carpinus Betulus L. 8. Old "double hedge" near Bruton. 10. Near Witham Friary; local, *Moss*.

Quercus sessiliflora Salisb. 2. Woods on Grabbist Hill, near Minehead, *Pugsley*. 3. Roadside hedge, Monkton Heathfield.

Salix triandra L. 4. Swamp at the south end of Chard Reservoir; perhaps planted, though it is associated with *S. cinerea*, and looks wild enough.

Elodea canadensis Michaux. 1. Pools in the Exe, about Bridgetown and Winsford.

Neottia Nidus-avis Rich. 8. Abundant under old beeches at Alfred's Tower, *Moss*.

Helleborine longifolia Rendle & Britten (*Epipactis palustris* Crantz). 3. Remarkably fine and locally abundant on Holme Moor and Slape Moor, near Wiveliscombe.

Orchis latifolia L. 2. Crowcombe; Stogumber. 9. Between Berrow and Brean.—**O. latifolia* × *maculata*. 2. On a clayey common, about a mile north-east of Stogumber Station, with the parents. 4. Near Chard Reservoir. Both good intermediates.—*O. ericetorum* Linton. 1. Exe valley, about Winsford and Exton. 2. Crowcombe Heathfield.—**O. ericetorum* × *latifolia*. 2. Several specimens were obtained in a moist upland pasture on clay, half a mile north-east of Stogumber Station. Leaves about half-way between the two, usually much blotched; flowers much deeper in colour (more purplish-red) than is ever the case in *O. ericetorum*;

shape of the spike and labellum nearly intermediate. Our '*type-maculata*' is less decidedly calcicole than I formerly supposed, occurring on clay and alluvium, though very rarely on peat; I suspect, however, that in such cases there is usually some admixture of lime, and the presence of *Daphne* in quantity about Stogumber tends to support this theory. As to the specific rank of *O. ericetorum* I no longer feel any doubt; but it should be borne in mind that there is a considerable range of variation in this plant, both in size and flower-colouring: fine specimens from deep-soil lowland meadows or marshes look very different from the small state of barren heaths.

Habenaria conopsea Benth. 3. In profusion and unusual luxuriance on Holme and Slape Moors, near Wiveliscombe. 4. Sparingly near the south end of Chard Reservoir. It is curious that a plant so partial to our dry chalk-downs should also be found in very wet bogs on non-calcareous soils.—*H. bifolia* Br. 4. Moist meadow near Chard Reservoir.—*H. virescens* Druce (*chloroleuca* Ridley). 3. Woods between Wrantage and Hatch Beauchamp; scarce.

Iris fœtidissima L. 2. Tivington, *Pugsley.*

Narcissus Pseudo-Narcissus L. 3. West Hatch; Hatch Beauchamp.

Ruscus aculeatus L. 8. Hedgerows near Bruton; locally called "Prickly Box," *Moss.*

Juncus squarrosus L. 1. Near Winsford.—**J. effusus* × *inflexus* (*J. diffusus* Hoppe). 3. Holme Moor.—**J. subnodulosus* Schrank (*obtusiflorus* Ehrh.) grows in great plenty on this and other moors near Wiveliscombe, towards Bathealton and Milverton.

Luzula Forsteri DC. 3. North Petherton.—*L. multiflora* Lej. 4. Near Chard Reservoir.

Triglochin palustre L. 3. Moors near Wiveliscombe.

Zannichellia palustris L. 4. Chard Reservoir.

Scirpus sylvaticus L. 8. Hill's Wood, Bruton, *Moss.*

Eriophorum latifolium Hoppe. 3. Holme Moor and Slape Moor, near Wiveliscombe.

**Cladium Mariscus* Br. 3. Abundant on the west and north borders of Holme Moor, which is a small bog, only a few acres in extent. A very unexpected discovery in v.-c. 5. Until last year it had not been recorded for North Somerset since Sole's time, and was supposed to be extinct through drainage not only on Sedgemoor, which probably took its name from the former abundance of this conspicuous plant, but also on the peat moor between Bridgewater and Glastonbury. Mr. H. Corder has, however, found one large specimen in the parish of Catcott, dis. 8.

Carex pulicaris L. 2. Wet meadow, east of Stogumber. 4. Near Chard Reservoir, with *C. echinata* Murr. (*stellulata* Good.) and *C. leporina* L. (*ovalis* Good.).—*C. disticha* L. 9. Berrow Marsh, on the coast; very local.—*C. divulsa* L. 4. Between Chard and Chaffcombe.—*C. ovalis* Good. 1. Winsford.—*C. Goodenowii* Gay. 2. Stogumber. 4. Chard Reservoir.—*C. pallescens* L.

4. Damp meadow near Chard Reservoir.—*C. panicea* L. 1. Winsford. 2. Crowcombe Heathfield; Stogumber. 4. Near Chard Reservoir.—*C. pendula* Huds. 8. "*The* sedge of the woods around Bruton," *Moss*. The same may be said of the Somerton neighbourhood; in fact, it is more generally abundant in Somerset than in any other county with which I am familiar, though rather local.—*C. helodes* Link (*lævigata* Sm.). 8. Woods on the greensand; fairly common [near Bruton], *Moss*.—*C. binervis* Sm. 2. Crowcombe Heathfield. 8. Kingswood Warren, *Moss*.—*C. Œderi* Retz. var. *œdocarpa* And. 4. Near Chard Reservoir. I found type-*Œderi* in a damp hollow at Crowcombe Heathfield, dis. 2; the only place where I have seen it in Somerset, hitherto. *C. hirta* L. 2. Crowcombe Heathfield; Stogumber. 4. Near Chard Reservoir.—*C. acutiformis* Ehrh. (*paludosa* Good.). 4. Chard Reservoir.—*C. riparia* Curt. 4. Chard Reservoir.—Var. **humilis* Uechtr. 9. In a small marsh on the coast, a mile or more north of Berrow Church; the type was not seen. Dwarf, 12 to 20 inches high; female spikelets small, 1 to 1½ inch long, ¼ to ⅓ inch broad; leaves slightly glaucous, ⅕ to ⅓ inch broad. Determined by Pfarrer G. Kükenthal; but apparently less extreme than Mr. C. E. Salmon's plant.

Milium effusum L. 1. Exe Valley, between Brushford and Exton.

Agrostis canina L. 3. Moors near Wiveliscombe. 4. Meadows near Chard Reservoir.

Aira præcox L. 2. Crowcombe Heathfield; Stogumber. 8. Abundant on the peat moor, *Moss*!

Holcus mollis L. 2. Crowcombe Heathfield.

Avena fatua L. 2. Dunster; Alcombe, *Pugsley*.

Sieglingia decumbens Bernh. 4. Pastures near Chard Reservoir.

Molinia cœrulea Moench. 2. Crowcombe Heathfield. 3. Moors near Wiveliscombe.

Poa nemoralis L. 2. Shady lane between Crowcombe Heathfield and Stogumber.

Glyceria plicata Fr. 4. Chard Reservoir.—*G. declinata* Bréb. 1. Exe valley at Bridgetown (parish of Exton). 2. Crowcombe Heathfield; associated with *Carex Œderi*.

Festuca elatior L. 3. Near Wiveliscombe.

Bromus giganteus L. var. *triflorus* Syme. 3. Milverton.—*B. ramosus* Huds. (*asper* Murr.). 2. Stogumber.—*B. commutatus* Schrad. 4. Damp meadows near Chard Reservoir; native.

Lastrea montana T. Moore (*Oreopteris* Presl.). 1. Hillsides in the Exe valley, two or three miles above Winsford.

Equisetum maximum Lam. 4. Chard Reservoir.

Nitella opaca Agardh. 3. Small field pond on Quantock Farm, West Monkton. Only known previously from one other station in Somerset, and that slightly doubtful.

ON THE NAME *VIOLA CANINA.*

By A. J. Wilmott, B.A.

The object of this paper is to endeavour to determine the species of violet to which the name *Viola canina* should be restricted. Linnæus, in founding the species, says (*Sp. Pl.* p. 935):—

> "*canina.* Viola caule demum adscendente, foliis oblongo-cordatis.
> Viola caulibus adscendentibus floriferis, foliis cordatis. *Hort. cliff.* 427; *Fl. suec.* 716, *Rov. lugdb.* 430; *Gron. virg.* 182; *Hall. helv.* 501; *Dalib. paris*, 269.
> Viola foliis cordatis oblongis, pedunculis subradicatis. *Fl. lapp.* 277.
> Viola martia inodora sylvestris. *Bauh. pin.* 199.
> Viola cœrulea martia inodora sylvatica, in cacumine semen ferens. *Bauh. hist.* 3, p. 543.
> *Habitat* in Europæ *apricis* ♃."

It should be borne in mind that Linnæus in his *Species Plantarum* was making the change from the earlier to the binomial system of naming plants, and therefore his short diagnosis must be considered in relation to the cited synonymy.

Of the first six references, the only useful description is in Haller's *Historia Stirpium Helveticæ*, p. 501 (1742). Haller remarks that the plant has "folia cordata, acuminata, modo longiora, modo latiora." He also says that the flowers are large, inodorous, and that the fruit has very acute keels. These characters indicate that he is describing a "wood violet," and not one of the heath violets.

In the *Flora Lapponica* (1737), no. 277, Linnæus refers to J. Bauhin's description, but gives no description of the plant.

C. Bauhin, in his *Pinax* (1623), gives a list of synonyms, and finally remarks: "Duplex est, altera major foliis majoribus & rotundioribus: altera minor, foliis mucronatis oblongis ac strictioribus." Since the first of these was always taken as the type, the plant meant by him as *V. martia inodora sylvestris* was the large wood violet, then often called *V. inodora major* (Rivinus), and now often called *V. Riviniana.*

The last reference given by Linnæus is the most important, for J. Bauhin, in his *Historia*, iii. p. 543 (1651), gives a really good description of the violet called by him "Viola cœrulea martia inodora sylvatica, in cacumine semen ferens." He said that he gave the good description to enable people to identify the plant, since his figure was unusually bad. This description is referred to by most pre-Linnean writers who do not themselves give a description. I will give some extracts from Bauhin's description:—"Folia circinatæ fere rotunditatis—supina parte leviter hirsuta, viridantia, prona vero glabra, dilutius virentia, fere luteola, interdum subpurpurea." The stipules are described as "in ambitu hirsuta," the capsules as "siliquæ longæ." All these points indicate that the plant is a "wood violet," and not one of the heath violets often called *V. canina* Reichb.; but the question is finally settled when he says, "calcar . . . purpuram utrinque secante fascia alba." Thus Bauhin's plant is definitely not a yellow-spurred "dog violet."

In conclusion, he remarks that there are two forms, one larger with round leaves, the other smaller "foliis mucronatis oblongis ac strictioribus." The former is clearly the plant now often called *V. Riviniana*; the latter, *V. sylvestris*, being the plant called by C. Bauhin "altera minor."

The only other good description that I have come across is given by Morison in his *Historia*, in which work the descriptions are usually excellent. This description is referred to in the *Hortus Cliffortianus*. Morison apparently considered it unnecessary to describe the plant afresh, but used J. Bauhin's description word for word, with the exception of a few alterations in the Latin.

Thus the *Viola canina* of the *Species Plantarum* is by no means the indefinite plant commonly supposed, but is definitely the plant now called *V. Riviniana* Rchb., or at most an "aggregate" of this and *V. sylvestris*.

This opinion was held by all botanists up till 1823. Sometimes the floras do not give good enough descriptions to enable one to say which plant was really intended, but others again by amplifying their descriptions, or by choosing their references, definitely restricted their plant always to a wood violet, and almost always to *V. Riviniana*. I might mention Curtis's *Flora Lond.* fasc. 2, t. 61 (about 1777*); Sowerby's *English Botany*, t. 620 (1799); Smith's *Flora Britannica*, i. p. 246 (1800); Smith's *English Flora*, i. p. 303 (1824); Host (1791), *Synopsis Plantarum in Austria*, p. 481; Riom et Clermont (1800), *Flora d'Auvergne*, ed. ii. p. 501; De Candolle (1824), *Prodromus*, i. p. 298; Roth (1827), *Enum. Pl. Phan. Germ.* i. p. 757. Very many other floras of all parts of Europe give no descriptions, but cite Bauhin's *Hist.* 3, p. 543, or Curtis's *Fl. Lond.* or *E. B.* 620, or some other well-known description of the common wood violet.

During that time many new names came into existence, the dates of those which apply to British plants being as follows:—

1753.	1798.	1813.	1814.	
V. canina L.				(*V. Riviniana* Rchb.)
	V. lactea Sm.			-
		V. ericetorum Hayne		(*V. canina* Rchb.)
			V. sylvestris Kit.	(*V. sylvatica* Fr.) (*V. Reichenbachina* Jord.)
			V. stagnina Kit.	(*V. lactea* Reichb.)

All this time the plant later called *V. Riviniana* was called *V. canina*, and Schultes, in his *Oest. Fl.* (1814), where for the first time describing a new violet under the name *V. sylvestris*, cites as a reference for *V. canina*, "*E. B.* 620."

In 1823, however, Reichenbach, in his *Plantæ Criticæ*, made a change. To the *V. canina* of *Eng. Bot.* 620 he gave the new name *V. Riviniana*, and used the name *V. canina* to comprise four varieties—var. *calcarea*, var. *sabulosa*, var. *ericetorum*, and var. *lucorum*. In the *Commentarius*, i. p. 61, he said, concerning the variety *lucorum*:—"Ecce tandem violam caninam Linnei. . . . Jam ubi ad verba Linneana respiciamus, falsas esse omnium auctorum, præter Haynii, violas caninas. . . . '*Dum primum florescit, acaulis est, et scapi quasi radicati, postea caules excrescunt, quibus pedunculi sunt infixi.*' Linn. (Ital., Rchb.)." I consider these words of Linnæus's a good description of the method of growth of the wood violets, which, as Linnæus says, when they first come into flower, are subacaulescent, at least as much so as is *V. canina* Rchb. Linnæus, in his diagnosis in the *Flora Lapponica*, modifies "acaulis" into "fere radicatis."

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* Clarke, *Journ. Bot.* 1895, p. 118.

This character of the wood violet explains why the plant was so often figured by pre-Linnean authors, *e.g.* Gerard and Morison, as an acaulescent violet.

Perhaps realizing that this was an insufficient reason for making such a great change, in his *Fl. Germanica* (1824), p. 706, he says of the var. *lucorum*: "Hæc nec alia est planta *operum Linnæi* (Ital. Rchb.) (1) verba foliis oblongo-cordatis nonnisi in hanc cadunt; (2) locus 'in apricis' huic tantum competit: (3) specimina Upsaliensia et Holmiensia nostræ pertinent."

The first two statements are, however, not quite correct. *V. sylvestris* often has leaves proportionally longer than those of *V. canina* var. *lucorum* Rchb., and was described by J. Bauhin "foliis mucronatis oblongis." Further, *V. Riviniana* var. *nemorosa* also has leaves "oblongo-cordatis." It is interesting to note that Borbas, in *Koch. Syn.* ed. iii., uses this word "oblongis" as evidence that *V. canina* L. is the plant now called *V. sylvestris*.

Again, the words "in apricis" merely mean "in sunny places," such as *V. Riviniana* very often affects. Most of the authors referred to by Linnæus say "in sylvis," or "in nemoribus," or say, as J. Bauhin did, "V. sylvatica . . ." Linnæus himself, in the *Flora Lapponica*, says, "in sylvis lapponicis non ita frequens nascitur."

Reichenbach himself immediately shows the amount of importance which he attached to his third reason, for he says: "Quid in herbario invenerint, minime mutabit sententiam meam, quam adeo species americana ibi pro V. hirta recepta sit." Few of Linnæus's specimens are really type specimens, as many were probably added after the publication of the *Species Plantarum*, and few have any date or locality on the sheets. In the Linnean Herbarium in London the sheet of *V. canina* contains three specimens of *V. canina* var. *lucorum* Rchb., and three of *V. rupestris* Schmidt, but the Linnean Herbarium known to Fries only contained *V. sylvatica* (Fr., *Mant.* iii. p. 118).

The weight of Reichenbach's great authority, however, obtained a large following immediately, and in a few years practically no adherents of the older view were left. It will be seen that neither Reichenbach nor his disciples gave due weight to the synonymy cited by Linnæus, particularly the descriptions by Bauhin, Morison, and Haller.

The views of Elias Fries, a great student of violets, will be now considered. In his *Novitiæ Floræ Suecicæ* (1828), p. 2, Fries uses the name *Viola canina* to include all the wood violets, heath violets, and sand violets (*V. arenaria* DC., *V. rupestris* Schm., &c.). This is done intentionally, as is witnessed by the synonymy cited, and also by his remarks (in *Mant.* iii. p. 118) in the first paragraph of his discussion of *V. canina*. A translation of his remarks is here given:—"The Linnean plant is manifestly an aggregate, for though it may now be possible from the words of his definition to relate the name successfully to a definite plant, yet for the sake of avoiding controversy, Linnæus ought scarcely to be cited as the author of the name, for there is no doubt that Linnæus very often had *V. arenaria* and *V. silvatica* before his eyes, which are the forms by far the most copiously and frequently met with in the neighbourhood of Upsala. It is certain that *V. silvatica* alone is present under this name in the Linnean Herbarium, wherefore De Candolle and many others have taken *V. silvatica* for the real *V. canina*, and Smith distinguished *V. canina* Rect. under the name *V. flavicornis*, calling *V. sylvatica V. canina*. If these be all joined together, Linnæus is the author of the species."

We have already shown that some of these statements are incorrect, and that the Linnean plant is definitely a wood violet. Again, Fries's position with regard to nomenclature is well known to-day, but it is now fairly generally agreed that it is desirable to retain the Linnean name * wherever practicable. With regard to the plants, Fries agrees with Reichenbach, having used the latter's *exsiccata* for help in identification (*Nov. l. c.*). It seemed necessary to state Fries's position because Babington refers to it when stating his own opinion.

Babington, in his *Flora of Cambridgeshire*, p. 302 (1860), Appendix iii., gives reasons for adopting Reichenbach's position. He says: "Ray remarks of his plant, named *V. canina sylvestris*, that it grows 'ad sepes et dumetis passim. Habetur et in palustribus frequens, nisi forte ea sit distincta species' (*Cat. Angl.* ed. i. 317). The former is therefore our *V. sylvatica*,† the latter *V. canina*. Linnæus is supposed by some botanists to have derived his plant from the books of Ray and Gerard; but he quotes neither of them in the *Hortus Cliffortianus* when founding the species. His character, 'V. foliis cordatis oblongis, pedunculis fere radicatis,' will not apply to our *V. sylvatica*, nor does the cut in

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* If the Linnean specific names are not to be retained, it is only logical to treat the genera in the same manner. The genus *Salicornia* Linn., as was pointed out to me by Dr. Moss, has now become the tribe *Salicorniæ* Du Mortier, including (in Dalla Torre, *Gen. Siphonog.*) eleven genera and thirty-three species, and yet the Linnean name *Salicornia*, with only nine species, is universally retained for one of these.

† *Viola sylvatica* Bab. *Manual*, ed. 5-8, is an aggregate of *V. sylvestris* Kit. and *V. Riviniana* Rchb. *V. silvatica* Fr. = *V. sylvestris* alone, *V. Riviniana* being called *V. silvatica* var. *macrantha* (Fries, *Mant.* iii. p. 121).

Tilland's *Icones Novæ*, 110, represent it, but is a tolerable figure of our *V. canina*. What we have had to determine is not what was the plant of Gerard, which differs in the two editions of his *Herbal*, but what was really intended by Linnæus. I fully agree with Fries in believing that the type of the Linnean *V. canina* is the plant which he and I and most of the Continental botanists so name."

The answer to this position is simple. First, Fries said there was no type, his words being "Planta Linnæana manifeste est collectiva," *Mant.* l. c.; secondly, the species was not founded in the *Hortus Cliffortianus*; again, the "character" there given *does* apply to *V. sylvatica* Bab.; and finally Linnæus, in his *Flora Anglica* (1754), p. 23, says that his *Viola canina* is Ray's *V. canina sylvestris*, which Babington himself admits to be *V. sylvatica*.

Hence, if the Linnean name *V. canina* must be retained, and there would appear to be no escape from this position, it should be used for the plant which has since 1823 been called *V. Riviniana*, retaining the name *V. ericetorum* Hayne, *Arzneigew.*, back of index to vol. 3, as the name for the dog violet (*V. canina* Rchb. non Linn.).

ALABASTRA DIVERSA.—PART XXI.

BY SPENCER LE M. MOORE, B.Sc., F.L.S.

ACANTHACEÆ AFRICANÆ NOVÆ.*

Thunbergia (§ EUTHUNBERGIA) **Gossweileri**, sp. nov. Herba ascendens, verisimiliter satis humilis, ramis tenuibus quadrangularibus glabris, foliis parvis subsessilibus ovatis vel oblongo-ovatis obtusis basi cordatis trinervibus membranaceis glabris, floribus parvis axillaribus solitariis pedunculis sat longis glabris insidentibus, bracteolis inter se liberis ovato-oblongis obtusis margine distanter ciliatis alibi scabriusculis, calycis dentibus paucis abbreviatis deltoideis vel subulatis, corollæ tubo bracteas circiter æquante dimidio superiore dilatato, antheris apice mucronatis loculis basi barbatis paris postici loculo altero calcarato altero mutico paris antici loculis ambobus muticis, stigmate bilabiato, capsula parva minute pubescente, seminibus ovoideis a dorso compressis verrucosis ventre breviter excavatis.

Hab. Angola, in open thickets at Kossuango, Kuivivi; *Gossweiler*, 4188.

Folia 2·5-3 cm. long., 1–2 cm. lat., in sicco viridia; petioli 1–2 mm. long. Pedunculi 1·5–2·5 cm. long. Bracteolæ 12–15 mm. long., humectatæ arcte reticulatæ, in sicco reticulum cerni non potest. Calyx totus 1·25 mm. long., hujus dentes summum ·6 mm. long. Corollæ tubus 15 mm. long., ima basi ægre 2 mm., triente inferiore 1·25 mm., sursum circa 5 mm. lat.; limbus circa 15 mm. diam. Antherarum loculi fere 2·5 mm. long. Ovarium 3·5 mm. long. Stigmatis lobi inter se propemodum æquales, ovati, circa

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* The specimens described are in the National Herbarium.

2·25 mm. long. Capsula ægre 15 mm. long., rostrum 10 mm. long. Semina brunnea, 3 mm. long.

To be inserted next *T. sessilis* Lindau; differing from it *inter alia* in the slender habit, the small glabrous leaves, long peduncles, and small scabriusculous bracteoles.

The specimen, the only one seen by Mr. Gossweiler, is less than two spans in length, and is unsatisfactory inasmuch as it has but one uninjured flower. A fragment of a second corolla is larger in its surviving parts than is the other, which probably has not quite reached its full development; hence the measurements given above may require some revision.

Thunbergia (§ Euthunbergia) **retefolia,** sp. nov. Verisimiliter suffruticosa caule erecto sparsim ramoso pube grisea dense obsito deinde glabrescente, foliis sessilibus lanceolato-oblongis rarius oblongo-obovatis obtusis 5-nervibus supra scabriuscule pubescentibus tandem scabriusculis subtus dense griseo-pubescentibus vix tomentosis, floribus in axillis superioribus solitariis pedunculis brevibus hirsutulis insidentibus, bracteolis oblongo-lanceolatis obtusis interdum brevissime cuspidulatis utrobique dense appresse griseo-pubescentibus, calycis dentibus paucis inter se inæqualibus subulatis sat longe acuminatis glabris vel sparsissime pilosis, corollæ tubo ex bracteolis eminente superne amplificato.

Hab. Angola, plateau between the Cuito and Cuiriri; *Gossweiler*, 2621.

Caulis 2–3 mm. diam. Folia solemniter 4–6 cm. long., 12–20 mm. lat., margine obscure undulata, pag. inf. reticulum optime aspectabile. Bracteolæ circa 2 cm. long. Calyx totus 5·5 mm. long.; dentes 5 mm. long. Corollæ tubus circa 2·5 cm. long., juxta basin 3 mm. superne usque ad 7 mm. lat.; limbus circa 3 cm. diam.

Here again the specimen is imperfect, and no further details can be given; in spite of this it is distinct enough to warrant description. The anthers and upper part of the style appear to have been eaten by insects, so the section cannot be stated without doubt, though the plant is almost certainly a member of the § *Euthunbergia.* The affinity appears to be with *T. Cycnium* S. Moore, but there are marked differences in leaves, bracts, and corolla.

Dyschoriste petalidioides, sp. nov. Planta semispithamea vel paullo ultra caulibus erectis fere a basi foliosis subsparsim griseo-pubescentibus novellis hirsutulis, foliis oblongo-oblanceolatis obtusissimis basi in petiolum longe extenuatis firme membranaceis utrinque præsertim in nervis puberulis, inflorescentiis brevibus cylindricis paucifloris, foliis floralibus pro rata magnis oblongo-obovatis obtusis margine undulatis vel etiam crenatis bracteolas breviter excedentibus, bracteolis lineari-oblanceolatis obtusis calycem plane excedentibus ut inflorescentiæ axis et bracteæ hirsutulis vel sparsim pubescentibus deinde glabrescentibus, calycis paullulum ultra medium divisi 5-carinati lobis anguste lineari-lanceolatis acuminatis ciliatis, corollæ glabræ tubo calycem excedente superne amplificato lobis obovatis obtusissimis inter se

subæqualibus, antherarum loculis basi muticis nisi microscopice mucronulatis, capsulis ——.

Hab. Angola, in short thicket-grown pasturage on the waggon-road between the Cului River and Kubanque, Forte Maria Pia; *Gossweiler*, 2917.

Folia 3–4 cm. long., 8–14 mm. lat.; petioli summum 15 mm. long. sed sæpius breviores. Inflorescentiæ (inclusis corollis pansis) circa 2 cm. long. Folia floralia sæpius 15–20 mm. long., bracteolæ 13–15 mm. Flores albi. Calyx 10 mm. long.; tubus 4·5 mm. Corollæ circa 20 mm. long.; tubus 15 mm. long., 1·25 mm. lat., faucibus adusque 4 mm. dilatatus; lobi 4·5 mm. long. Antheræ oblongæ, 1·5 mm. long. Ovarium oblongum, 2 mm. long.; stylus puberulus, 16 mm. long.

This has much the appearance of a small *Petalidium*. The large floral leaves and bracteoles distinguish it from its congeners.

Disperma Gossweileri, sp. nov. Suffruticosum, intricate ramosum, ramulis sat tenuibus ascendenti-patentibus foliosis scabriusculis, foliis subsessilibus oblongis vel anguste oblongo-ovatis obtusis vel obtuse acutis basi sæpissime levissime cordatis undulatis denticulatisve pergamaceis pag. utravis scabriusculis, floribus mediocribus in axillis superioribus solitariis vel 2–3-nis, foliis floralibus parvis ovatis acutis ut inflorescentiæ axis et bracteolæ et calyx glanduloso-pubescentibus, bracteolis anguste oblongo-obovatis obtusis calyci subæquilongis, calycis usque ad medium divisi tubo sursum leviter dilatato lobis oblongis acutiusculis inter se paullo inæqualibus sc. postico ceteris latiore, corollæ tubo cylindrico extus pubescente limbo bilabiato labii antici basi palatiferi ultra medium trilobi lobis lateralibus oblongo-obovatis obtusissimis lobo intermedio obovato emarginato æquilongis labii postici lobis oblongo-subquadratis obtusissimis, ovulis pro loculo 1.

Hab. Angola, along the Cuelai River at Massaco; *Gossweiler*, 2699.

Planta saltem $\frac{2}{3}$-metralis. Rami seniores 2–3 mm., juniores 1·5 mm. diam. Folia pleraque 3–4 × 1–1·5 cm. (exstant minora circa 20 × 8 mm.), in sicco griseo-olivacea. Folia floralia circa 10 × 6 mm.; bracteolæ 10 × 4 mm. Flores cœruleo-violacei, ore tuboque brunneo. Calyx 9 mm long.; tubus 4·5 mm. long.; lobi 4·5 × ± 1 mm., lobus posticus ægre 2 mm. lat. Corollæ tubus 9 mm. long., 2 mm. lat.; labium anticum 5 mm. long., hujus lobi 3 mm. long.; labium posticum 5 × 2·5 mm. Filamentorum longiorum pars exserta 2·5 mm., breviorum modo ·5 mm. long. Antherarum loculi subsequialti, utrinque obtusi, 1·75 mm. long. Ovarium ovoideum, glabrum, vix 2 mm. long.; stylus puberulus, 8 mm. long.

The affinity of this is with *D. viscidissimum* S. Moore, which, among other characters, has flowers different in several respects.

Phaylopsis sangana, sp. nov. Herbacea, crebro ramosa, ramis gracilibus sat distanter foliosis tetragonis puberulis, foliis longe (summis breviter) petiolatis ovatis vel oblongo-ovatis sæpe cuspidato-acuminatis apice ipso obtusis basi sæpe maxime obliquis membranaceis utrinque sed præsertim pag. inf. puberulis, inflorescentiis brevibus perpaucifloris vix unquam etiam breviter strobiliformibus, foliis floralibus a corollis superatis suborbicularibus basi cordatis glanduloso-pubescentibus, calycis segmentis anticis angustissime lineari-lanceolatis acuminatis quam posticum ovatum manifeste brevioribus segmentis omnibus glanduloso-pubescentibus, corollæ tubo calycem excedente superne amplificato limbo bilabiato quam tubus breviore, antheris subinclusis loculis basi mucronulatis, ovario oblongo-ovoideo sursum puberulo, stylo exserto puberulo.

Hab. Angola, in woods near Sanga, on the River Kuve; *Gossweiler*, 4467.

Folia summum 7 × 4 cm., sed sæpius minora, e. g. 3–4 × 1·5–2 cm., in sicco viridia, subtus aliquanto griseola; petioli foliorum majorum 2·5–4·5 cm. minorum ± 7 mm., illi pilosi, hi pubescentes. Folia floralia ± 8 × 8 mm., raro usque ad 14 × 17 mm. Flores dilute violacei. Calycis segmentum posticum 7·5 × 4·5 mm.; segmenta antica 5 mm., segmenta lateralia 4·5 mm. long. Corollæ extus sparsim puberulæ tubus 9 mm. long., inferne 1·5 mm. superne 6 mm. diam.; labium posticum 5 mm. long.; lobi ovato-oblongi, apice retusi, 2·5 mm. long.; labium anticum 6 mm. long., lobi 3 mm. Antherarum loculi ·75 mm. long. Stylus circa 1 cm. long.

This has much the appearance of *P. obliqua* S. Moore, but without mentioning other points of difference, the floral leaves and corollas are much larger.

Strobilanthopsis glutinifolia, comb. nov. (*Hygrophila glutinifolia* Lindau in Baum Kunene-Zamb. Exped. p. 374.)

Hab. In rocky situations at Mt. Amaral, Kunene, and in thickets at Kassuango, Kuiriri; *Gossweiler*, 1835, 2979.

Very near the original species *S. hircina* S. Moore, the chief difference residing in the form of the leaves.

Blepharis pascuorum, sp. nov. Herbacea, crebro ramosa, ramis laxe patentibus tenuibus linea pubescente exclusa glabris, foliis elongatis sessilibus anguste linearibus acutis margine revolutis integris coriaceis cito glabris paribus juxtapositis sæpius inæqualibus, spicis pro rata parvis cylindricis ramos floriferos nunc breves nunc elongatos gracillimosque coronantibus 2–5-nis nonnunquam solitariis unifloris, bracteis pluribus obovatis dorso carinatis margine juxta apicem spinis filiformibus debilibus ascendenti-patentibus nigris onustis apice recurvis induratisque 3–5-nervibus inferne scariosis extus pubescentibus, bracteolis bracteis similibus sed paullulum angustioribus calyce brevioribus, calycis extus dimidio superiore pubescentis segmento postico lanceolato obtuse acuto quam anticum lineari-lanceolatum bifidum acuminatum paullulum longiore segmentis lateralibus lineari-lanceolatis spinoso-acuminatis reliqua fere æquantibus, corollæ limbo subintegro intus pubescente.

Hab. Angola, in pastures by the Rio Cambambe, Cuebe, near Munonque; *Gossweiler*, 2603.

Planta diffusa, spithamea. Rami sæpissime circa 1 mm. diam.

Rami floriferi spicarum infimarum 5–10 mm. long., spicarum reliquarum sæpius 2·5–5 cm. long. Folia in sicco olivaceo-nigra, majora 7–10 cm. long., 1–2 mm. (raro usque ad 5 mm.) lat., minora ± 3 cm. long.; costa centralis optime eminens. Spicæ (flore panso haud exempto) 17 × 8 mm. Bracteæ extimæ 5–8 mm. long., interiores usque ad 12 × 5·5 mm., horum spinæ pleræque 4 mm. long. Bracteolæ 13 × 4·5 mm. Flores violaceo-albi. Calycis segmentum posticum 17 × 3 mm.; anticum 16·5 × 2·5 mm., segmenta lateralia 16 mm. long., hæc dorso eminenter carinata. Corolla 17·5 mm. long.; tubus 7 mm. long., basi 2·75 mm., juxta medium 2·5 mm., ore 4 mm. lat.; limbus 10·5 × 5 mm. Filamenta 3 mm., antheræ 2·25 mm. long. Capsulæ non suppetunt.

To be inserted next *B. cuanzensis* Welw., differing from it in the even slenderer habit, the narrow leaves, the small spikes, and the much smaller flowers not deep yellow as are those of the other.

Blepharis decussata, sp. nov. Suffruticosa ramulis vetustioribus prostratis distanter foliosis subteretibus scabride puberulis ramulis junioribus erectis crebro foliosis scabride pubescentibus, ramulorum vetust. foliis subsessilibus ovato-oblongis acutis basi obtusis margine spinoso-serrulatis coriaceis glabris paribus juxtapositis subæqualibus vel aliquanto inæqualibus ramulorum jun. parvulis oppositis decussatis ovatis margine spinoso-serrulatis glabris, spicis ramulos erectos solitatim coronantibus ellipsoideis plurifloris, bracteis obovatis apice patentibus ipso acutis margine juxta apicem sparsim spinoso-dentatis rigidis valide 3–5-nervibus ciliolatis, bracteolis ut bracteæ coriaceis dilutissimeque badiis has leviter excedentibus linearibus longe caudato-acuminatis puberulis, calycis bracteolas facile excedentis extus villosuli segmento postico ovato triente superiore angustato apice obtuso segmento antico postico subæquilongo late ovato-lanceolato apice bifido segmentis lateralibus quam cetera manifeste brevioribus oblongo-lanceolatis acutis dorso carinulatis, corollæ tubo ipso sub ore subito constricto limbo trilobo.

Hab. Angola, in open "Mumua" woods on the River Cuito, below La Macaca; *Gossweiler*, 2817.

Ramuli fertiles summum fere bispithamei; horum internodia solemniter 1–1·5 cm. long. Folia majora 20–35 × 8–12 mm.; ramulorum fertilium folia 10–15 × 7–9 mm., in sicco griseo-viridia. Spicæ corollis inclusis adusque 5 × 1·5 cm., sed sæpius breviores. Bracteæ 12 × 6 mm.; bracteolæ 13·5 mm. long. Flores cyanei. Calycis segmentum posticum 20 mm. long., anticum 19 mm.; segmenta lateralia 10 × 4 mm. Corolla tota 29 mm. long.; tubus 6 mm. long., ima basi 2·5 mm., juxta medium 4 mm., sub ore 2·75 mm., ore 5 mm. lat.; limbus extus villosulus, intus puberulus, 23 mm. long., dimidio proximali 8 mm. lat., dimidio distali summum 16 mm.; lobi latissime obovati, laterales apice rotundati, intermedius emarginatus 5 × 6 mm. Filamenta 10 mm. long., antheræ 5 mm. Capsula ignota.

Near *B. tetrasticha* Lindau, of which the fertile branches bear somewhat similar though much larger decussating pairs of leaves, but the bracts and bracteoles are entirely different.

The same collector's no. 2971, from "Mumua" woods, near the River Cuiriri, is evidently a flowerless specimen of the above.

Lepidagathis (§ Neuracanthopsis) **Gossweileri**, sp. nov. Herbacea, bispithamea, caulibus e rhizomate satis crasso ascendentibus fere a basi ramosis gracilibus quadrangularibus ad nodos breviter barbellatis ceteroquin glabris vel fere glabris, foliis lanceolatis vel lineari-lanceolatis obtusis basi in petiolum brevem coarctatis firme membranaceis glabris, cymis axillaribus terminalibusve brevibus secundis paucifloris glabris, bracteis ovato-lanceolatis acuminatis membranaceis quam bracteolæ cymbiformes acutæ inferne membranaceæ superne scariosæ longitrorsum prominenter 5-costatæ paullo longioribus, calycis segmentis bracteolas excedentibus segmento postico ovato-oblongo obtuso longitrorsum plurinervi segmentis anticis postico æquilongis ovato-lanceolatis acutis lateralibus lineari-lanceolatis acuminatis segmentis omnibus scariosis, corollæ tubo calycem leviter excedente cylindrico faucibus ipsis dilatato labii antici extus albo-pubescentis lobis suborbicularibus inter se circa æqualibus labio postico quam anticum plane breviore apice retuso, antheris posticis 1-locularibus, stylo incluso, ovulis pro loculo 2.

Hab. Angola, among rocks at Langtingo, Kaconda; *Gossweiler*, 4264.

Folia 3–5·5 cm. long., 7–20 mm. lat., in sicco olivacea. Bracteæ 9–11 mm. long., inter se sæpe inæquales; bracteolæ circa 8 mm. long. Flores albi. Calycis segmenta majora ægre 11 mm. long., lateralia 9·5 mm. Corollæ tubus 12 mm. long., 2·5 mm. lat., faucibus 4·5 mm. lat.; labium anticum 8 mm. long., hujus lobi 6 × 5·5 mm.; labium posticum 4·5 × 5 mm. Staminum anticorum filamenta 5 mm. long., posticorum 2·5 mm.; illorum antheræ 1·5 mm. horum 1·25 mm. long. Discus 1·25 mm. alt. Ovarium ovoideum, 2·5 mm. long. Stylus 12 mm. long., glaber.

This has much the appearance of *L. macrochila* Lindau, but can be at once distinguished from it by the entirely different corollas. It is nearer *L. nemorosa* S. Moore, which, however, has dissimilar leaves, bracts, and bracteoles.

Asystasia Welwitschii S. Moore. There appear to be two forms of this species. The typical one has leaves with a distinctly cordate base, and, the petiole being very short, the leaves are to a slight extent amplexicaul. To the second form, which has much narrower leaves tapering off gradually to the base, belong *Baum*, 237, and *Gossweiler*, 1068, 1074, 1905. This last may be called *A. Welwitschii* var. *stenophylla*.

(To be continued.)

SCANDINAVIAN ROSES.

By Carl Traaen.

During the last few years several important works on Scandinavian roses have been put forth by the distinguished Swedish rhodologist, Dr. S. Almquist. These deserve to be brought under the notice of British botanists because they contain many novel views as to the classification of certain groups. These views are to be found in the following publications in the Swedish language, though the diagnoses are in Latin:—(1) Studier öfver Bergianska Trädgårdens spontana Rosaformer. Acta Horti Bergiani. Stockholm, 1907. (2) Skandinaviska former af *Rosa glauca* Vill. Arkiv för Botanik. Uppsala and Stockholm, 1910. (3) Skandinaviska former af *Rosa Afzeliana* Fr., section *glauciformis* At. Arkiv för Botanik Uppsala and Stockholm, 1911.

Dr. Almquist is of opinion that *R. canina* (including *dumetorum*) and *R. glauca* (including *coriifolia*) are strictly separated. But a better characteristic than the direction of the sepals is to be found in the difference of the styles, a character the importance of which he has learned from his fellow-countryman, another famous rhodologist, the Rev. R. Matsson. *R. canina* (including *dumetorum*) has the styles a little prolonged above the opening of the disc and more or less separated. In *R. glauca* (including *coriifolia*), on the other hand, they are short and densely coherent. By making the styles the deciding character, many forms hitherto placed under *subcanina* and *subcollina* would be classed under *R. canina* and *R. dumetorum*.

Dr. Almquist believes, with Crépin and several other students of *Rosa*, that *R. glauca* and *R. coriifolia* form one collective species, to which he gives the name of *R. Afzeliana* Fr. Crépin proposed to call it *R. glauca* Vill., but as Dr. Almquist thinks that Villars had in view a glaucescent form, and as the colour of the leaves is of the highest importance in the opinion of the Swedish author, he gives the collective species the name of *R. Afzeliana* Fr., which includes both glaucescent and green-leaved forms. The glaucescent species he calls *R. glauca* Vill. and *R. glauciformis* At. (=Almquist), the former glabrous, the latter hairy. The green-leaved species are *R. virens* Wg., glabrous, and *R. virentiformis* At., hairy. Dr. Almquist feels convinced that the hairy forms have been developed from the glabrous. He has not found any hairy form that has not its corresponding one among the glabrous, although in a few cases there are glabrous forms to which the corresponding hairy ones have not yet been found. By like differentiation the teeth and colour of the leaves sometimes vary a little, but the essential characters of the corresponding forms are always the same. The two sections, therefore, *R. glauca* Vill. and *R. glauciformis* At. are divided into parallel series of forms or subspecies, of which the diagnoses are identical, except that the one set is glabrous, the other hairy. In diagnosing these subspecies the chief characters relied on are the colour and consistence of the leaves, the form of the leaflets, the shape and direction of the teeth. The form and direction of the prickles and the shape of the fruit are also taken into account. Dr. Almquist does not think that the direction of the sepals, reflexed or erect upon the fruit, is a character which can be relied on, and he therefore takes no account of it. In the diagnosis of his subspecies, moreover, he does not mention the development of the serration, simple or compound, nor the presence or absence of glandular hairs on the sepals or peduncles. These characters indicate only modifications of the same primary type. He agrees with Matsson in designating such modifications by the prefixes *per*, *præ*, *sub*, *super*, and *ob*. To these Almquist has added *hirtelli*, *tersi*, and *hirti*. The primary has the leaflets simply serrate or nearly so; a per-form has the leaflets biserrate; an ob-form has glands on the margin of the sepals; sub and super forms have glands on the backs of the sepals, the former with simple, the latter with biserrate serration. A per-form with the margin of the leaflets very glandular becomes a præ-form. A hirtelli form indicates a transition to *R. glauciformis*. Tersi is applied to a form of *R. glauciformis*, hairy only on the nerves; hirti to one more or less hairy over the surfaces.

By the use of these prefixes, dealing with the innumerable forms is greatly simplified. It has been found possible to class the Scandinavian forms of *R. glauca* into thirty-four subspecies and those of *R. glauciformis* into thirty-one, both with a good many varieties. The author has not been content to describe the types as detached from each other. His aim is to group them according to resemblance or relation based on the above-mentioned characters. In accordance with his view as to the relation between glabrous and hairy species, the groups and subgroups are common to *R. glauca* and *R. glauciformis*.

It appears from the above that we have here a completely new method of classifying roses, based on natural principles.

SHORT NOTES.

OROBANCHE RITRO Gren. & Godr. var. HYPOCHÆROIDES.—This very beautiful *Orobanche*, conspicuous for its pure yellow colour, is parasitic on *Hypochæris radicata* and other composites at St. Ouen's Bay, Jersey (see Journ. Bot. 1907, 425, and Rep. Bot. Exch. Club, 1907, 258), where the Rev. L. V. Lester-Garland showed it me in 1906, when I at once saw that it did not belong to the *O. minor* section. Dr. Beck puts it as a *forma* under Grenier and Godron's plant, which is only recorded from the vicinity of Marseilles, where, as its name suggests, it is parasitic on *Echinops Ritro*; but it appears to me sufficiently distinct to warrant the varietal rank which I have given it. An examination of Mr. Hanbury's herbarium shows that he gathered it in the eighties in the same place, and that it was then named, I believe, by Mr. Arthur Bennett as *O. minor* var. *flavescens* Reuter. Still earlier examples are in the Boswell herbarium, collected by Syme himself in 1866, labelled "I think from the Grand Havre, but a ticket says St. Ouen's Bay, possibly misplaced." Doubtless Syme's memory was faulty, and the ticket gives the correct habitat, as at present I have no evidence for its occurrence in Guernsey. We may therefore safely delete *O. minor* Sm. var. *flavescens* Reuter from my *List*, as it is synonymous with the above so far as the Jersey plant is concerned.—G. Claridge Druce.

Orobanche reticulata Wallroth var. procera (Koch) Druce. —In Prod. Fl. Brit. i. 338 (Oct. 1909), Mr. F. N. Williams describes this plant, and adds, "not hitherto recorded in Britain," but he has overlooked the fact that I exhibited it at the Linnean Society in the autumn of 1908, and published an account of its discovery by Mr. N. E. Craven in this Journal for March, 1909, p. 110, as well as in the *Report of the Botanical Exchange Club for 1908* (pp. 334–7), where it is fully described under the above name. Mr. Craven, in answer to a letter which I wrote (Pharm. Journ. 1908, July 18), said he had found in 1907 an *Orobanche* which he believed was parasitic on *Cirsium eriophorum*, and which, although near *O. minor*, did not agree with the description in Babington's *Manual*. On July 31 he sent me two specimens, which on examination I identified as *O. procera* Koch. Afterwards I sent them to Dr. Günther Beck, who placed them under *O. reticulata* Wallr. as forma *procera* (Koch). In 1909 I visited the locality with Mr. A. H. Evans, and found that the plant was parasitic on the *Cirsium* growing on a grassy slope with bushes, on the Permian limestone which overlies the Millstone grit, at an altitude of about 300 ft. My object in writing this note is chiefly to direct attention to another possible habitat, that of Sowerby, Yorkshire. Recently, thanks to Mr. F. J. Hanbury's kindness, I had an opportunity of examining some plants in the Boswell Syme herbarium now in his possession, when I noticed a specimen from that place gathered as *O. elatior* by Mr. J. Gilbert Baker as long ago as 1851, which I believe is the same plant. All our Broom-rapes parasitic on thistles deserve careful examination.—G. Claridge Druce.

Carex aquatilis Wahl.—I read with much pleasure Mr. Marshall's article on Dalmally Plants, and should like to ask him to reconsider his remarks on *Carex aquatilis* (p. 196). I do not know a single station for this in Perthshire above 1000 ft. I am aware of the record given in the Perthshire Flora, but I have never admitted that the plant from the marsh between Ben Lawers and Meall Garbh was a form of *C. aquatilis*, although Mr. Bennett regarded it as such. As to the form referred to by Mr. Marshall, found between Ben More and Am Binnein, there are three distinct forms found in this marsh. On the north-east side, where the roots reach the gravel, there is a low-growing form which is often named *C. rigida* × *Goodenowii*; further in, on occasionally submerged situations, it takes another form which approaches *C. rigida* var. *limula*; and, again, in the deep, constantly submerged parts, we find a third form, and this is the only one which resembles *C. aquatilis*. All these I believe to be merely states of *C. rigida*, for the following reasons:—No other *Carex* on our hills has such dark-coloured stolons and leafless sheaths, such dark glaucous leaves, or so acute triquetrous stems. I admit that in the last form the stems are nearly trigonous, but the other points mentioned, together with the fact that basigynia forms do occur, show clearly that it cannot be referred to *C. aquatilis*, and there is no *C. aquatilis* within miles of it. Anyone interested will find the plant under discussion in many of the marshes in Perthshire and Forfarshire over 2560 ft. Mr. Marshall has named this same form (collected by him as well as myself on the Caenlochan watershed) *C. rigida* var. *inferalpina*, and, I believe, correctly. It may be argued that it is *C. Goodenowii* var. *recta* × *rigida*, but of this I am doubtful.—P. Ewing.

Poa palustris L.—When botanizing with Mr. J. S. Purser, on July 20th, in some disused brick-pits, between Worcester and Upton-on-Severn, I gathered a grass which I could not recognise, but which proved to be *Poa palustris* L. The station appears to be a similar one to that in which this species was discovered in Gloucestershire, in 1908, by the Rev. H. J. Riddelsdell, and the plants were growing among vegetation almost identical with that mentioned in his note (Journ. Bot. 1909, 73–4). These old brick-pits are close to the bank of the river Severn and, I should suppose, some fourteen or fifteen miles further up stream than Mr. Riddelsdell's station. On a second visit we found the plants well distributed over the swampy ground, now an osier bed, around the pits (the willows noticed being *S. viminalis* and *purpurea*), but we saw none upon the river bank, which at this place is steep and unsuitable for their growth. Like the Gloucestershire plants, they should be referred to the var. *effusa* Aschers. et Graebn. Another less satisfactory "find" was that of a single plant of *Bromus interruptus* Druce, on June 28th, growing by the side of a road across Malvern Common. I failed to find any other plant of this in the neighbourhood and left some flowering stems to ripen upon it, in the hope of its continuance and increase.—Richard F. Towndrow.

Cornish Plants.—This July I paid a flying visit to Cornwall and once again explored the ballast-heaps and waste ground at Par. In the marshes near there was an abundant growth of *Elisma ranunculoides*, and *Orchis latifolia* in several forms, one being a narrow-leaved form, perhaps worth describing as *O. latifolia* L. var. *linearifolia*, since the var. *angustifolia* Lois. (Pers. Syn. ii. 504, 1807), characterised by its long and keeled linear-lanceolate leaves and almost undivided labellum, is doubtless a form of *incarnata*. Here, too, were hybrids of *O. latifolia* with the plant I am calling *O. maculata* var. *præcox* Webster (*O. ericetorum* Lint.); I saw no true *O. maculata* in Cornwall this year. *Polygonum aviculare* L., in several forms, occurred, including the var. *erectum*. On the ballast-heaps I found *Geranium modestum* Jord., as limited by Mr. Clement Reid, on which I will send a note later, since I think that, unless of hybrid origin, it deserves specific rank. At Par it may be a casual, as I only saw a plant or two, but it is abundant at Newquay, where Dr. Vigurs showed me its locality, the plant being in early July quite withered. At Newquay I saw, as a casual in waste ground, *Bromus tectorum* L.

in some quantity. At Par, as aliens, I saw *Centaurea aspera* Willd., *Lepidium perfoliatum* L., *L. ruderale* L., *Rapistrum rugosum* Berg. (abundantly), *Conringia orientalis* Dum.; *Sisymbrium Sophia* L. (one specimen), *Œnanthe odorata* Jacq., *Crepis biennis* L., *Hyoscyamus niger* L. At Falmouth I got a plant of *Brassica elongata* Ehrh., at St. Germain's *Reseda alba* L. *Populus deltoides* Marsh.: to this must, I think, be referred all, or nearly all, the Cornish records. I have an impression of seeing true *P. nigra* when last in Cornwall, but I have no note. On this occasion *deltoides* was alone observed.—G. CLARIDGE DRUCE.

FRULLANIA GERMANA IN MADEIRA. — In my list of some Madeira *Hepaticæ* in Journ. Bot. p. 158, *Frullania teneriffæ* N. ab E. will be found on record. I now hear from Mr. S. M. Macvicar that, in consultation with Prof. Schiffner, he is satisfied that my plant is the closely allied species *F. germana* Tayl., both male and female plants being present. The interest attaching to this change of species centres in the fact that the latter plant has hitherto been known only from the British Isles and Faroe; thus its range of distribution is now greatly extended.—ELEONORA ARMITAGE.

REVIEW.

Alpine Plants of Europe, together with Cultural Hints. By HAROLD STUART THOMPSON, F.L.S. With 64 coloured plates (311 figures). 8vo, cloth, pp. 287. Price 7*s.* 6*d.* net. Routledge.

THE number of popular books devoted to "alpines," of varying degrees of excellence and including some by no means excellent, is considerable, but there was certainly room for this one. The author combines botanical knowledge with an intimate acquaintance with the plants *in situ*; and this combination gives to his work an accuracy and precision which are lacking in many preceding works on the subject. Mr. Thompson tells us that "the book owes its origin chiefly to the fact that there is no well-illustrated work in the English language descriptive of the Flowering Plants of the whole range of the Alps"; the numerous coloured illustrations are from Seboth's *Alpine Plants*, and although small are fairly satisfactory. It is however the text, in which some seven hundred species are described, in which the superiority of the volume over its predecessors is chiefly manifested; the descriptions are full and clear, the distribution, with details as to altitude, &c., is carefully given, and the short cultural notes, although "that part of the work is quite secondary to the botanical side," are sufficient to be useful; "a number of plants rarely or never seen in English gardens are recommended for introduction."

The descriptive portion of the work is preceded by five chapters, the first defining "what are alpine plants," the second summarizing the characteristics of their native haunts, the third dealing with their cultivation, and the fourth instructing how to collect and preserve them; these show the author's practical acquaintance with his subject, and a great deal of useful information is packed into each of them. At the end of the book is a useful glossary, a good general map of the Alps, and an excellent—we are glad to say only *one*—index. In the scientific nomenclature Mr. Thompson does not pedantically follow the Vienna Rules when the adoption of these would involve the abandonment of well-known names in favour of new combinations; and we are entirely in accord with him in thinking that the majority of those for whom the book will be useful would not be "disposed to indulge in profitless wrangling over abstruse questions" arising out of this subject. We are specially glad to see that he does not sacrifice to the ridiculous fetish which demands what is absurdly called an "English name" for every species; as he truly says, "it is as easy to remember the universally used Latin name as it is to adopt ill-defined and unsatisfactory English ones." The volume is well-printed, well-bound, and reasonably cheap, and should obtain a wide circulation.

BOOK-NOTES, NEWS, &c.

Prof. R. C. Punnett's tiny volume on *Mendelism*, published six years ago and noticed in this Journal for 1905 (p. 277), containing so admirable an account of the Mendelian theory, has now developed into a much larger and more comprehensive third edition; it has, we observe, appeared also in American and German editions, and is being translated into Swedish. Little more need be said to prove the obvious value and usefulness of the book. We may, however, add that the present edition is adorned by a number of very beautiful and useful illustrations, and is not only brought up to date by the addition of information as to the many observations which have been made since the original work first appeared, but contains chapters on "Variation and Evolution," on the economical aspects of Mendelism, and on Man from the Mendelian point of view, all of which are of the greatest interest and the utmost importance. As a brief introduction to the knowledge of a subject which is now of such prime importance and which bids fair to retain that position for many a long day, we know nothing to surpass, or even to compare with, Professor Punnett's admirable book. It is published by Messrs. Macmillan at 5*s*.

"Botanists and the Insurance Bill" is the heading given by the *Morning Post* to a question in Parliament asking "whether a person who had undergone a course of study at the Botanic Medical College, Southport, and had obtained a diploma therefrom entitling him to practise the botanic system of medicine, would be considered a duly qualified medical practitioner under the provisions of the National Insurance Bill." It is satisfactory to know that "the answer was in the negative."

ALABASTRA DIVERSA.—PART XXI.

By Spencer le M. Moore, B.Sc., F.L.S.

Acanthaceæ Africanæ Novæ.*

(Concluded from p. 298.)

Barleria (§ Somalia) **Gossweileri,** sp. nov. Fruticosa, ramosa, ramis cortice sordide albo obductis tandem fere glabris, ramulis foliosis tomento albido pilis brevibus glandulosis intermixtis indutis, foliis parvis lanceolato-oblongis obtusis basi in petiolum cuneatim angustatis chartaceis pag. sup. appresse strigoso-pubescentibus pag. inf. pilis simplicibus albo-tomentosis margine pilis glandulosis onustis, floribus pluribus ad apicem ramulorum subapproximatorum thyrsam glanduloso-pubescentem referentibus, bracteis anguste linearibus glanduloso-pubescentibus, calycis glandulosi segmento antico postico subconformi oblongo-obovato apice integro retusove basi obtuso lobis lateralibus ceteris brevioribus lineari-lanceolatis acuminatis, corollæ cyaneæ tubo subcylindrico limbi lobis 3 majoribus 3 late obovatis minoribus 2 obovato-oblongis omnibus emarginatis, staminibus 2 exsertis, staminodiis ——, stylo exserto glabro, capsula ovoidea rostrata glanduloso-pubescente 2-sperma.

Hab. Benguella, Lengue; *Gossweiler*, 4968.

Folia summum 4 × 1·2 cm., sæpius vero minora; petioli 5–fere 15 mm. long. Inflorescentia circa 10 × 5 cm. Bracteæ 5–10 mm. long. Calycis segmentum anticum 15–18 × 7 mm., posticum summum 19 × 8 mm.; segmenta lateralia 10 mm. long. Corolla saltem 3 cm. long.; tubus circa 5 mm. lat.; lobi majores 15 × 10 mm., minores 13 × 7 mm. Filamenta saltem 1·5 cm. long., antheræ ægre 4 mm. Capsula (rostro 7 mm. long. haud exempto) ægre 2 cm. long. Semina orbicularia, anguste alata, dilute straminea, 5 mm. diam.

The habit is much that of *B. alata* S. Moore belonging to § *Eu-Barleria.* It is quite unlike the other known species of § *Somalia.*

The flowers have been partly eaten by insects, so that full measurements of the corolla cannot be given, neither were the staminodes seen.

Barleria (§ Eu-Barleria) **benguellensis,** sp. nov. Caulibus pluribus rariramosis fere a basi foliosis subtetragonis bifariatim puberulis demum glabris, foliis subsessilibus sessilibusve lanceolatis vel anguste lanceolato-ovatis apice mucronatis basi angustatis ipso obtusis utrinque perspicue reticulato-nervosis tenuiter coriaceis glabris, floribus in spicam brevem terminalem digestis foliis floralibus valde redactis stipatis, bracteolis anguste lineari-lanceolatis acutis quam calyx brevioribus, calycis segmento postico ovato apicem versus angustato apice acuto basi rotundato segmento antico postico simili nisi paullulum minore bidentato segmentis ambobus radiatim plurinervibus pergamaceis glabris segmentis lateralibus lanceolatis caudato-extenuatis margine ciliolatis, corollæ majusculæ tubo a calyce breviter superato dimidio superiore dilatato lobis inter se subæqualibus oblongo-obovatis obtusis, staminibus 2 breviter exsertis staminodiis 2 abbreviatis anantheris, ovario ovoideo sursum aliquanto attenuato glabro, stylo exserto glabro, ovulo pro loculo unico addito secundi rudimento haud facile aspectabili.

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* The specimens described are in the National Herbarium.

Hab. Benguella, among short grasses in open thickets and "Mumua" woods at Anha; *Gossweiler*, 3621.

Folia pleraque 6–8 cm. long., 22–30 mm. lat., ut calycis segmenta majora cystolithis nigris subsparsim prædita. Bracteolæ 12–15 mm. long. Spicæ corollis exemptis solemniter 5 × 3 cm. Flores dilute violacei. Calycis segmentum anticum 25 × 18 mm., hujus dentes triangulares, acuti, 2 mm. long.; segmentum posticum 24 × 17 mm.; segmenta lateralia 13 mm. long. Corolla tota circa 45 mm. long.; tubus 20 mm. long., deorsum 3 mm. faucibus 9 mm. lat.; lobi 25 × 12–15 mm. Filamenta 19 mm. long., crassa, basi pubescentia; staminodia vix 2 mm. long., pubescentia. Discus 1·25 mm. alt. Ovarium 5 mm., stylus 34 mm. long.

Differs from *B. polyneura* S. Moore, *inter alia*, in shape of leaf, small narrow floral leaves, and larger calyx-segments.

Barleria (§ Eu-Barleria) **kacondensis**, sp. nov. Sesquibispithamea, caulibus e rhizomate sat crasso pluribus ascendentibus frequenter ramosis ut rami pilis simplicibus hirtulo-pubescentibus, foliis sessilibus vel subsessilibus lanceolatis vel lineari-lanceolatis acutis basi obtusis supra scabriusculis subtus ad nervos appresse hirtulis, floribus sessilibus subsessilibusve in axillis superioribus solitariis foliis floralibus reliquis similibus sed paullo minoribus stipatis, bracteolis calyce brevioribus anguste lineari-lanceolatis obtusiusculis ut calyx in nervis sparsim hirtulo-pubescentibus, calycis segmento postico ovato acuto basi obtuso margine integro nervis lateralibus prominentibus utrinque 4–5 inferne nervo centrali conjunctis ita nervum latissimum constituentibus segmento antico postico simili nisi paullulum minore apice bidentato segmentis lateralibus oblongo-lanceolatis acutis, corollæ majusculæ tubo calyce breviore sursum gradatim dilatato lobis inter se subæqualibus, staminibus 2 exsertis staminodiis 2 parvulis subulatis omnino anantheris, stylo exserto, ovulis pro loculo 2, capsula ovoideo-oblonga sursum rostrata glabra.

Hab. Angola, everywhere in open "Mumua" woods at Kaconda, near Munonque velho, and at Forte D. Maria, Dongo; *Gossweiler*, 2909, 4251, 4147.

Folia 3–7 cm. long., 8–18 mm. lat., supra in sicco olivacea vel olivaceo-nigra, subtus grisea vel griseo-viridia; petioli summum 3 mm. long. Pedunculi dum adsint circa 2 mm. long. Bracteolæ circa 2 cm. long. Flores omnimodo albi. Calycis segmentum posticum 33 × 17 mm., anticum 32 × 14 mm., segmenta lateralia margine ciliata, 15 mm. long. Corolla tota circa 4 cm. long.; tubus 17 mm. long. juxta basin 5 mm. lat., sursum ad 10–12 mm. usque dilatatus; lobi latissime obovati, circa 20 × 15 mm. Filamenta crassissima, inferne pubescentia, circa 10 mm. long.;

antherarum loculi oblongi, utrinque obtusi, 4 mm. long. Staminodia ægre 2·5 mm. long., pubescentia apice glabra. Ovarium oblongo-ovoideum, vix 3 mm. long. Stylus glaber, circa 3 mm. long. Capsula 2 cm. long.; semina duo 5 mm. diam., duo 3 mm.; retinacula superne incurvo-rostrata, acuminata.

Distinguished from *B. violascens* S. Moore by the indumentum, the anticous segment of the calyx toothed only instead of being markedly 2-lobed, the acute not acuminate lateral segments of the calyx, the larger corolla white throughout with larger anthers, &c.

The dimensions of the calyx-segments above given are those of no. 4251; the other specimens have these organs somewhat smaller.

Barleria (§ Eubarleria) **pabularis**, sp. nov. Caule circa spithamea simplici pilis brevibus hispidulis bifariatim onusto, foliis majusculis sessilibus oblongo-oblanceolatis vel spathulato-obovatis apice obtusissimis basi longe extenuatis obtusis pergamaceis pagina utravis cito glabris, floribus in axillis superioribus approximatis ita capitulum fere referentibus, foliis floralibus reliquis similibus sed gradatim minoribus, bracteolis lineari-oblanceolatis obtusis calyci circa æquilongis, calycis segmento antico obovato apice bidentato 9-nervi postico obovato obtuso fere æquilongo ambobus integris membranaceis viridibus sparsim glanduloso-puberulis segmentis lateralibus lineari-lanceolatis sursum attenuatis acutis crassiusculis, corollæ tubo calyce breviore dimidio superiore gradatim amplificato lobis inter se subæqualibus late obovatis obtusissimis, staminibus 2 inclusis, staminodiis——, ovario ovoideo sursum attenuato, stylo breviter exserto, ovulis pro loculo 2, capsula ovoidea sursum rostrata fere omnino glabra.

Hab. Angola, Anha; *Gossweiler*, 3083, 3622.

Folia summum 11 × ægre 4 cm., modica 8–9 × 2·5–3 cm., in sicco glauco-virentia, pag. sup. fusciora. Inflorescentia corollis exemptis 5–6 × 5 cm. Bracteolæ 28–30 mm. long. Flores albi. Calycis segmentum posticum usque ad 33 × 17 mm.; anticum 30 × 18 mm.; segmenta lateralia 12 mm. long. Corolla tota circa 4 cm. long.; tubus 17 mm. long., inferne 5 mm. superne 10 mm. lat.; lobi circa 25 mm. long., summum fere 20 mm. lat. Filamenta crassa, 9 mm. long.; antherarum loculi oblongi, obtusi, 3·5 mm. long. Ovarium 4 mm., stylus 19 mm. long. Capsula 18 mm. long., rostrum solum 7 mm.

Nearest *B. Welwitschii* S. Moore, and much like it in habit and foliage. The much larger bracteoles, calyx-segments, and corolla afford an easy means of distinguishing it.

Barleria (§ Eubarleria) **subglobosa**, sp. nov. Caulibus e rhizomate robusto pluribus ultraspithameis erectis validis scabrido fulvo-stellato-tomentosis inferne nudis glabrescentibusque superne distanter foliosis, foliis oblongo-oblanceolatis obtusis vel obtusissimis basi in petiolum brevem angustatis coriaceis supra pilis stellatis subsparsim pubescentibus subtus laxe fulvo-stellato-tomentosis, inflorescentiis terminalibus subglobosis plurifloris foliis floralibus abbreviatis late ovatis obtusis coriaceis ut bracteolæ calycesque fulvo-stellato-tomentosis circumdatis, bracteolis spathulatis obtusis calycem circa æquantibus, calycis segmento postico oblongo-obovato sursum gradatim attenuato obtuso antico anguste oblongo-obovato bilobo vix æquilongo segmentis lateralibus linearibus acuminatis segmentis omnibus membranaceis, corollæ tubo calyce paullo breviore faucibus ipsis leviter dilatato lobis tubo paullo brevioribus inter se subæqualibus oblongo-obovatis obtusis, staminibus——, ovario 2-ovulato additis duorum vestigiis minimis, capsula late ovoidea brevissime rostrata apice acuta glabra nitida, seminibus quovis in loculo solitariis.

Hab. Angola, in "Mumua" woods near Forte Conselheiro Borgia, at Cutchi; *Gossweiler*, 3139.

Folia ± 9 cm. long., 2·5–3 cm. lat., pag. sup. in sicco olivacea, pag. inf. fulvo-viridia; costæ reticulumque pag. inf. maxime eminentes; petioli circa 8 mm. long. Folia floralia usque ad 24 × 14 mm., intus nitida pilisque stellatis subsparsim inspersa. Inflorescentiæ corollis exemptis circa 32 × 30 mm. Bracteolæ 21 mm. long. Flores cyanei. Calyx 20 mm. long.; segmenta majora ut lateralia pag. inf. appresse fulvo-hirsuta; segmentum posticum 18 mm. long., 6 mm. lat., hujus lobi triangulares, acutiusculi, 5 mm. long; segmenta lateralia 13 mm. long. Calyx sub fructu ad 25 mm. augmentatus. Corollæ tubus 17 mm. long., 2 mm. (faucibus 3·5 mm.) lat.; lobi 12–14 × 6–6·5 mm. Discus 1·5 mm. alt. Ovarium glabrum, 4 mm. long. Capsula dilute badia, 9 mm. long. Semina orbiculata, retinaculis acuminatis insidentia, 7 mm. diam.

This belongs to Clarke's subsection *Stellato-hirtæ*, and would seem nearest to *B. buddleioides* S. Moore, which has differently shaped leaves, papery floral leaves, much larger flowers, &c.

Mr. Gossweiler found only one corolla, and, although the form of that is perfectly retained, there are no stamens, neither is there a perfect style.

Justicia (§ Calophanoides) **unyorensis**, sp. nov. Herba circa sesquimetralis caule ascendente sparsim ramoso geniculato subtetragono pilis retrorsis appresse pubescente deinde puberulo ramulis foliosis pubescentibus, foliis ovato-lanceolatis obtusis basi in petiolum cuneatim angustatis membranaceis utrinque pilis appressis strigillosis obtectis petiolis pubescentibus, floribus subsessilibus perpaucis ex axillis superioribus satis approximatis oriundis, bracteolis parvulis oblongis calyce multo brevioribus, calycis segmentis lineari-lanceolatis acuminatis strigilloso-pilosis, corollæ extus sparsim puberulæ tubo calyci circa æquilongo parum incurvo superne leviter amplificato labio postico late oblongo-ovato apice bifido quam anticum triente superiore divisum et palato valde intruso indutum breviore, staminibus breviter exsertis antherarum loculo inferiore calcari inflexo onusto, capsula oblonga acuta basi compressa superne sparsissime puberula ceterum glabra 4-sperma.

Hab. Toro, swamp near Kibala Forest: Unyoro, Hoima; *Bagshawe*, 1228, 1529.

Folia pleraque 3·5–5 cm. (rarissime 7 cm.) long., 1·3–3 cm.

lat., superiora imminuta in folia floralia sæpius 1·5–2 cm. long. transeuntia, in sicco viridia; petioli solemniter 5–10 mm. long., rarissime ad 30 mm. usque. Bracteolæ vix 1 mm. long. Flores albi, purpureo-striati. Calyx 4 mm. long. Corollæ tubus fere 5 mm. long., basi 1·25 mm. faucibus 2 mm. lat.; labium posticum 3·5 mm. long.; labium anticum ægre 5 mm. long.; hujus lobi 1·5 mm. long., obtusissimi, lobus intermedius quam laterales paullulum latior. Filamenta vix 2 mm. long.; antherarum loculus sup. ·8 mm. long., loculus inf. (calcari incluso) 1·2 mm. Ovarium 2 mm., stylus 4·5 mm. long. Capsula 7 mm. long.; semina sicca ovoidea, rugulosa, 1 mm. long., retinaculis truncatis affixa.

Among other characters this can be distinguished from *J. Whytei* S. Moore by the smaller corolla and almost glabrous capsule.

Justicia (§ CALOPHANOIDES) **rupicola**, sp. nov. Frutex ramosus suffrutexve ramis mediocriter divaricatis annotinis nudis cortice cinereo obductis glabris hornotinis foliosis pubescentibus, foliis subsessilibus ovatis obtusis basi cordatis subamplexicaulibus membranaceis utrobique scabriusculis, floribus in axillis superioribus solitariis vel 2–3-nis pedunculis brevissimis insidentibus vel ad apicem ramulorum perbrevium sitis, bracteolis lineari-lanceolatis acutis calycem æquantibus vel breviter superantibus, calycis segmentis 5 inter se æqualibus lanceolatis acuminatis dorso carinulatis superne subtiliter pubescentibus, corollæ extus pubescentis tubo calycem breviter superante late cylindrico recto labio postico deltoideo-ovato bifido antico alte trilobo æquilongo, staminibus exsertis, ovario glabro, stylo inferne pubescente superne leviter incrassato glabro, capsula 4-sperma glabra.

Hab. Benguella, a shrub common among sandstone rocks at Lengue; *Gossweiler*, 1687. A small undershrub in sunny places, also at Lengue; *Idem*, 4933, 4949.

Planta sec. cl. detectorum 2–5 ped. alt. Folia ± 20 × 12 mm. in sicco subolivacea; petioli circa 2 mm. long., pubescentes. Pedunculus dum adsit circa 2 mm. long. Bracteolæ 4·5–5·5 mm. long. Flores albi. Calyx 4·5 mm. long., 1–1·5 mm. lat.; segmenta albo-marginata. Corollæ tubus 5–6 mm. long., 2 mm. lat.; labium posticum 4·5 mm. long., juxta medium 3 mm. lat.; labii antici lobi laterales oblongi, obtusi, 3·5 × 1·2 mm.; lobus intermedius obovato-oblongus obtusissimus 4 × 2·5 mm. Filamentorum pars exserta 2·5 mm. long.; antherarum loculus alter 1 mm. long., alter (calcare incluso ægre 1 mm. long.) 2 mm. Ovarium ovoideum, obtusum, 2 mm. long. Stylus 6 mm. long. Capsula nitida, 13 mm. long. Semina non suppetunt.

A plant with much the appearance of *Monechma platysepalum* S. Moore, which, besides being a *Monechma*, has oblong leaves with an obtuse base, broader calyx-segments, &c. The affinity appears to be with *J. orchioides* L. fil.

The smaller specimens (nos. 4933 and 4949) have somewhat larger flowers than has no. 1687. Except for this and the habit there seems no difference between the two forms.

Monechma rigidum, sp. nov. Caulibus e rhizomate pluribus strictis subdistanter foliosis tetragonis microscopice furfuraceis, foliis brevipetiolatis ovato-oblongis obovatisve apice subito breviter cuspidulatis ipso acutis basi obtusis conspicue nervosis coriaceis utrinque microscopice furfuraceis, spicis paniculiformibus folia plerumque excedentibus, floribus solitariis approximatis foliis floralibus valde abbreviatis stipatis, bracteolis calyce brevioribus ovatis acutis ut spicarum axis et folia floralia et calyx dense fulvo-pubescentibus vix tomentosis, calycis segmentis 5 inter se æqualibus obovato-oblongis acute obtusis rigidis costis 3 pubescentibus humectate nigris maximeque perspicuis longitrorsum percursis, corollæ extus fulvo-pubescentis tubo calyce breviore lato sursum paullo inflato labio postico late oblongo-ovato bidentato antico postico æquilongo late obovato breviter 3-lobo, staminibus exsertis, ovario hirsuto, stylo piloso-pubescente apicem versus glabro necnon leviter incrassato, ovulis pro loculo 2 superiore plus minus casso, capsula 2-sperma.

Hab. Angola, Munonque and Forte Princesa Amelia; *Gossweiler*, 2535, 3355.

Planta ± semimetralis. Folia 3–5 cm. long., 1·5–2 cm. lat.; costæ laterales utrinque 3, fere parallelæ, pag. utraque maxime aspectabiles, pag. sup. planæ, pag. inf. eminentes; petioli ± 3 mm. long. Folia floralia circa 5 mm. long.; bracteolæ totidem, rigidæ. Flores albi. Calyx 7 mm. long.; segmenta 1·5 mm. lat. Corollæ tubus 5 mm. long., basi 1·75 mm. faucibus 3 mm. lat.; labium posticum 6 mm. long., inferne 5 mm. lat.; labium anticum 5 mm. lat., hujus lobi inter se fere æquales, suborbiculares, ægre 2 mm. long. Filamentorum pars exserta 4·5 mm. long.; antherarum loculus alter 1·75 mm. long., alter (calcare bilobo 1 mm. long. incluso) 3 mm. Ovarium 1 mm. stylus 8 mm. long. Capsula adhuc cruda ellipsoidea, pubescente.

To be inserted in the genus next *M. scabridum* Clarke, but the leaves, floral leaves, bracteoles, and calyx of the two are diverse in several respects.

Monechma glaucifolium, sp. nov. Herbacea, fere semimetralis, caule erecto superne ramoso tetragono demum glabrescente ramulis ascendentibus foliosis pube grisea obtectis, foliis petiolatis obovato-oblongis obtusis obtusissimisve basi acutis glaucis firme membranaceis supra glabris subtus sparsim puberulis, spicis paniculatis folia excedentibus, foliis floralibus perpaucis vetustioribus foliis similibus nisi minoribus ceteris valde imminutis, floribus inter se sat distantibus, bracteolis ovatis acutis calyce multo brevioribus, calycis ut folia floralia et bracteolæ griseo-puberuli segmentis 5 æqualibus lanceolatis obtusis prominenter longitrorsum 3-costatis, corollæ extus sparsim pubescentis tubo calycem breviter excedente lato superne leviter amplificato labio postico late ovato apice rotundato ipso emarginato labio antico posticum leviter excedente oblongo-obovato breviter 3-lobo, staminibus exsertis, ovario glabro, stylo triente inferiore puberulo, ovulis pro loculo 2 superiore casso.

Hab. Angola; *Gossweiler, sine no.*

Folia 2·5–3 cm. long., 12–14 mm. lat.; costæ laterales utrinque 3, aperte arcuatæ; petioli ± 4 cm. long. Nodi florigeri inter se distant 5–10 mm. Folia floralia vetustiores 1·5–2·5 cm. long., juniores modo circa 2 mm. Bracteolæ 2 mm. long. Flores verisimiliter albi. Calyx 7 mm. long., summum ægre 2 mm. lat. Corollæ tubus 8 mm. long., basi 3 mm. faucibus 4·5 mm. lat.; labium posticum 7 mm. long., summum 6 mm. lat.; anticum 8 mm. long., summum vix 5 mm. lat., hujus lobi laterales 1·5 × 1·5 mm., lobus intermedius 2 × 1·8 mm. Filamentorum pars exserta 6 mm. long.; antherarum loculus alter 1·5 mm. long., alter (calcare gracili incluso 2·5 mm. long.) 4 mm. Ovarium 2 mm., stylus 12·5 mm. long. Capsula immatura 2-sperma, 4 mm. long.

Allied to the preceding, but differing from it markedly in foliage and inflorescence.

The ticket accompanying the specimen has been mislaid, so that locality and number cannot be cited.

Monechma virgultorum, sp. nov. Herba fere metralis caulibus e rhizomate pluribus erectis validis inferne nudis superne sparsim ramosis tetragonis longitrorsum sulcatis ut ramuli ascendentes foliosi subtiliter pubescentibus, foliis subsessilibus ovato-lanceolatis raro ovatis obtusis basi rotundatis firme membranaceis pag. utraque puberulis, floribus in spicis densis paniculatis folia circa æquantibus dispositis, foliis floralibus parvis oblongis obtusis ut bracteolæ calycesque pubescentibus, bracteolis oblongis obtusis calyce brevioribus, calycis segmentis 5 lineari-oblongis quinto aliquanto imminuto acuto, corollæ extus pubescentis tubo calyci æquilongo dimidio superiore inflato labio postico ovato apice rotundato ipso emarginato labio antico posticum paullo excedente late obovato triente superiore diviso lobis ovatis obtusissimis, staminibus breviter exsertis, ovario apice pubescente, stylo inferne puberulo ceterum glabro, ovulis pro loculo 2 superiore casso.

Hab. Angola, in thickets at Kassuango; *Gossweiler*, 3679.

Folia 2·5–3·5 cm. long., 1–1·5 cm. (raro 2 cm.) lat.; costæ laterales utrinque 3, fere parallelæ; petioli 2 mm. long. Spicæ 3–5 cm. long. Folia floralia ± 8 mm. long. Bracteolæ 8·5 mm. long. Flores albi. Calyx 10 mm. long.; segmenta majora 9 mm., segmentum posticum 7·5 mm. long. Corollæ tubus 9·5 mm. long., inferne 3 mm. superne 5 mm. lat.; labium posticum 6 × 4 mm.; anticum 7 × 5 mm., hujus lobi 2 mm. long., lobus intermedius lateralibus paullulum latior. Filamentorum pars exserta vix 3 mm. long.; antherarum loculus alter 1·8 mm. long., alter (incluso calcare curvato gracili 1·75 mm. long.) ægre 4 mm. Ovarium circa 2 mm. long., stylus 11 mm.

This also is allied to *M. scabridum* Clarke, and so to the two plants last described. In foliage *M. virgultorum* is much like *M. rigidum*, but the bracteoles and flowers give an easy means of distinguishing the two.

Dicliptera Bagshawei, sp. nov. Ramis ascendentibus crebro foliosis hirsutis, foliis pro rata parvis oblongo-obovatis apice obtusis mucronulatisve basi in petiolum brevem angustatis utrinque sparsim pubescentibus dein puberulis novellis albo-hirsutis, spiculis ad apicem ramorum paucis approximatis bifloris, spicularum bracteis inter se æqualibus vel fere æqualibus oblanceolato-oblongis brevissime mucronulatis sparsim hirsutis, bracteolis anguste lineari-lanceolatis acutis sparsim hirsutis, calycis segmentis bracteolis paullo brevioribus angustissime lineari-lanceolatis acuminatis pubescentibus, corollæ tubo calycem facile superante parum inflato labiis late obovatis postico integro, staminibus exsertis, capsula ovoidea basi contracta hirsutula.

Hab. Unyoro, near Masinde; *Bagshawe*, 1539.

Speciminum nobis obviorum rami ex caulibus demortuis forsan ustis oriundi, 10–15 cm. alt., quadrangulares. Folia summum 2 × 1 cm., sæpissime ± 12 × 5–8 mm., pag. sup. in sicco fusca, pag. inf. griseo-viridia; petioli modo 2 mm. long. Bracteæ 6–7 mm. long.; bracteolæ ± 4·5 mm. Calycis segmenta 3·5–4 mm. long. Corolla punicea, faucibus alba; tubus 7·5 cm. long., inferne 1·25 mm. ore 2 mm. lat.; labia 7 mm. long., antici dentes deltoidei, obtusi, 1 mm. long. Filamenta 5 mm. long.; antherarum loculi ovoidei, 1 mm. long. Ovarium 1·5 mm. long.; stylus glaber, 7 mm. long. Capsula 4 mm. long.

Near *D. albicaulis* (*Diapedium albicaule* S. Moore), from which, among other features, the habit, the hirsute stems, and absence of glandular pubescence afford easy means of distinguishing it.

Dicliptera betonicoides, sp. nov. Herba annua, sat elata, ramulis ascendentibus aliquantulum anfractuosis distanter foliosis quadrangularibus secus angulos albo-pubescentibus, foliis subsessilibus lanceolato-oblongis superioribus gradatim angustioribus summis oblongo-linearibus obtusis basi cordatis (foliis summis vero obtusis) membranaceis cito costa media pilis brevibus appressis obsita exempta glabris in sicco læte viridibus, spicis ex apice ramorum ramulorumque oriundis pedunculatis sessilibusve subcylindricis densifloris, spiculis 1-floris addito secundi mero rudimento, spicularum bracteis pro rata parvis altera breviore obovato-oblonga obtusissima hispidule ciliata straminea lineis tribus longitudinalibus viridibus valde perspicuis apice conjunctis dorso ciliolatis percursa altera majori oblongo-oblanceolata obtusa 3-nervi margine hyalino excluso viridi, bracteolis oblongo-lanceolatis debiliter aristulatis bracteam breviorem sæpe leviter excedentibus margine ciliatis, calycis segmentis lineari-lanceolatis acuminatis margine ciliolatis, corollæ extus puberulæ tubo sursum levissime ampliato labio antico 3-denticulato quam posticum subrotundatum paullulum longiore, staminibus breviter exsertis.

Hab. Angola, Kassuango; *Gossweiler*, 3018, 3680.

Planta semimetralis. Internodia inferiora ± 4 cm. long., summa sæpe usque ad 6 vel etiam 10 cm. Folia solemniter 3–4·5 cm. × 5–8 mm., raro usque ad 6 cm. × 13 mm., cystolithis comparate elongatis pag. utraque prædita; petioli summum 2 mm. long. Pedunculi summum 2·5 cm. long. Spica ± 2 × 1 cm., rarissime 3·5 cm. long. Bractea major 7 mm. long., minor 5·5 mm.; bracteolæ 5–6 mm. Flores albi, roseo-lineati. Calyx

4·5 mm. long. Corollæ tubus 6 mm. long., inferne 1 mm. faucibus 2 mm. lat.; labium anticum 4 × 3·5 mm., posticum 3·5 × 4 mm. Filamenta 2 mm., antherarum loculi vix 1 mm. long. Ovarium late ovoideum, 1 mm. long.; stylus puberulus, 7 mm. long.

A very distinct species, to be inserted next *D. Melleri* Rolfe. The subsessile leaves, cordate at base, the small bracts, the bracteoles often slightly exceeding the broader of the bracts, are among its main features.

NOTES ON THE FLORA OF DERBYSHIRE.—II.*

By E. & H. Drabble.

Part of the summer vacations of 1909 and 1910 were spent in Derbyshire. The notes here recorded are the outcome of field-work during those periods. During part of the time in 1909 we had the advantage of Dr. S. E. Chandler's help. Our thanks are also due to Mr. S. Steele, the Secretary of the East Derbyshire Field Club, who has furnished us with a list of plants observed by the Club during their rambles.

Nineteen species or varieties hitherto unrecorded for the county have been found, and fifty-three new to the geological formation on which they occurred. These records are gradually breaking down the absolute species—differences between the floras of the geological formations in the County. This, of course, is to be expected. What is required is an account of the relative frequencies of the various plants in the different districts, and it is our intention to deal with this subject at an early date. Many notes with this object have been collected already.

Species new to the county are marked with a dagger; new records for the geological divisions are starred.

The divisions of the county according to the geological formation have been used here as in our former paper.

Ranunculus circinatus Sibth. (C) Hardwick.—*R. acris* L. var. †*Friesianus* R. & F. (*C) Chesterfield; var. *vulgatus* (Jord.) (L) Cave Dale; a very dwarf form, 2–3 in. in height.—*R. Flammula* L. (C) Wingerworth. This is a remarkably stout form, quite upright from the base and with ovate obtuse lower leaves. It does not exactly agree with any form the description of which we have seen.

Papaver somniferum L. (L) Alport, apparently a grain-alien.

Fumaria pallidiflora Jord. (*G) Lumsdale. [This is recorded in the *Flora* as on (L); it should be on (G).—E. D.]—†*F. muralis* Sonder. (*C) Chesterfield. This plant occurred in some quantity in the years 1908–09 on a piece of cultivated land where potatoes are grown; last year (1910), however, we failed to find it.

Barbarea intermedia Bor. (*L) Ashover.—*B. vulgaris* Ait. (G) near Crich.—*Alyssum incanum* L. (*C) waste ground at

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* See Journ. Bot. 1909, 199–207.

Wingfield, quite established.—*Draba muralis* L. (L) Monsal Dale.—*Sisymbrium officinale* Scop. var. *leiocarpum* DC. (*C) Staveley.—†*S. pannonicum* Jacq. (*C) Wingfield, Chesterfield, quite established; (*Y) Rowsley, an odd plant by the roadside.—*Brassica alba* Boiss. (*Y) Hope.

Viola Riviniana Reichb. var. †*flavicornis* (Forster). (*G) Moors at Cathole.—*V. odorata* L. var. *dumetorum* (Jord); (C) Renishaw Park Wood.—*V. obtusifolia* Jord. (C) Calow, Renishaw, Newbold, Dunston, Eckington, Heath; (*G) Loads, Littlemoor.—*V. agrestis* Jord. (C) Tapton, Newbold.—*V. Deseglisei* Jord. (G) Ashover Hay.—"*V. hortensis.*" (C) Spital, Newbold. This is simply a wild degenerate garden pansy.—*V. calaminaria* Lej. (L) Sheldon, near the old lead mines.

Polygala oxyptera Reichb. (C) Linacre; (L) Masson.—*P. serpyllacea* Weihe. (G) Cathole.

Dianthus deltoides L. (L) Lathkil Dale.—*Silene noctiflora* L. (C) Sheepbridge.—*Lychnis Githago* Scop. (C) Staveley.—*Arenaria tenuifolia* L. (L) Lathkil Dale.—*A. serpyllifolia* L. var. *viscidula* Roth. (*P) Scarcliffe Park Wood; (*C) Hasland; (L) Middleton-by-Youlgreave, Arbelow. — *Sagina apetala* Ard. (L) Lathkil Dale.—*S. procumbens* L. var. †*spinosa* Gibs. (*C) Spital, Linacre; (*L) Lathkil Dale, Ashover.—*S. ciliata* Fr. (C) Hady.—*S. nodosa* Fenzl var. †*glandulosa* (Bess.). (*L) Via Gellia, Buxton.—*Spergula sativa* Boenn. (*C) Calow.—*S. arvensis* L. (G) Loads.

Hypericum perforatum L. var. †*angustifolium* DC. (*P) Elmton.—*H. humifusum* L. (C) Wingfield.

Malva moschata L. (L) Monsal Dale; (C) Inkersall; var. *heterophylla* Lej. (*C) Walton.—*M. sylvestris* L. var. †*lasiocarpa* Druce. (*L) Ashover.

Linum usitatissimum L. (C) Brookside, Wooley, as a grain-alien.

Medicago lupulina L. var. *Willdenoviana* Koch. (C) Wooley, Walton, Wingfield, Hady, Staveley; (G) Eastmoor, Ashover Hay; (L) Pindale, Bakewell, Over Haddon. This variety with glandular hairy fruit is very common and widely distributed in the county. The Rev. E. F. Linton tells me that he once found "a hairy-fruited form not glandular" in the county. This would probably be var. *scabra* Gray.—*Trifolium pratense* L. var. †*americanum* Harz. (*C) Tapton, on cultivated land.—*T. procumbens* L. (L) Alport.—*Vicia hirsuta* Gray. (C) Hady.—*Lathyrus montanus* Bernh. (C) Cobnar Wood, a form with very broadly elliptical leaflets.

Alchemilla vulgaris L. var. *filicaulis* (Buser). (C) Tapton.—*Agrimonia Eupatoria* L. (C) Eckington, Moorwood Moor.—*A. odorata* Mill. (L) Monsal Dale.

Parnassia palustris L. (L) Monsal Dale.—*Ribes Grossularia* L. (L) Lathkil Dale.

Sedum anglicum Huds. (L) Ashover.

Epilobium hirsutum L. (Y) Hope.—*E. montanum* L. (Y) Hope.—*E. parviflorum* Schreb. (C) Staveley, Renishaw; (G)

Eastmoor; (*Y) Baslow.—Var. *rivulare* (Wahl.). (*G) Crich; (*Y) Haddon.—*E. roseum* Schreb. (C) Ogston, Brackenfield, Spital; (*Y) Haddon.—*E. obscurum* Schreb. (C) Brockwell, Brackenfield; (*Y) Stanton.—*E. palustre* L. (C) Hardwick.—*E. hirsutum* × *montanum*. (*C) Hasland; (*L) Alport; in both cases with the parent species. — †*E. hirsutum* × *roseum*. (*C) Hasland, with the parent species.—†*E. hirsutum* × *obscurum*. (*C) Tapton, with the parent species.—*E. montanum* × *obscurum*. (C) Brockwell, with the parent species.—*Circæa lutetiana* L. (*Y) Stanton.

Conium maculatum L. (C) Staveley.—*Pimpinella Saxifraga* L. var. *dissecta* With. (C) Wingfield.—*Myrrhis odorata* Scop. (L) Pindale.—*Silaus flavescens* Bernh. (L) Bakewell.—*Angelica sylvestris* L. (*Y) Hope. — *Heracleum Sphondylium* L. var. *angustifolium* Huds. (C) Somersall, Brackenfield; (G) Littlemoor, Ashover Hay; (L) Lathkil Dale.—†*Caucalis latifolia* L. (*C) Spital, in a cornfield in 1908; we have failed to find it since then.

Cornus sanguinea L. (C) Inkersall.

Asperula odorata L. (C) Nether Loads; (G) Ashover Hay.

Valeriana sambucifolia Mikan. (*Y) Hope.

Dipsacus sylvestris Huds. (C) Tapton.—*Scabiosa Columbaria* L. (*Y) Hope.

Gnaphalium sylvaticum L. (L) Lathkil Dale.—*Bidens tripartita* L. (C) Hardwick.—*Matricaria inodora* L. A form totally devoid of ray-florets, but otherwise quite normal and rather exceptionally vigorous, was found near Chesterfield in 1908, and was still there in 1910.—*M. suaveolens* Buch. (C) Sheepbridge. — *Tanacetum vulgare* L. (G) near Ashover. — *Senecio viscosus* L. (C) Eckington. This plant is very rare in Derbyshire.—*S. erucifolius* L. (C) Sutton Wood, Dunston.—*Carduus crispus* L. (*Y) Hope.—*C. nutans* L. (L) Crich Stand, with white flowers. — *Cnicus arvensis* Hoffm. var. †*vestitus* Koch. (*C) Chesterfield; var. †*mitis* Koch. (*Y) Baslow.—*Serratula tinctoria* L. (C) Hasland; a dwarf form about four inches in height, with sessile or subsessile capitula. This is doubtless the form recorded in the *Flora* as var. *monticola* (Bor.). It agrees exactly with plants from Perranporth on the coast of Cornwall, and very closely with the Lizard plants.—*Centaurea Scabiosa* L. (L) Middleton-by-Youlgreave.—*Picris hieracioides* L. (L) Lathkil Dale.—*Taraxacum erythrospermum* Andrz. (C) Wingerworth.—*Crepis biennis* L. (C) Inkersall, Calow.

Campanula latifolia L. (C) Eckington.

†*Gentiana germanica* Willd. (*L) Castleton, Fallgate.

Symphytum officinale L. (L) Fallgate.—*S. peregrinum* Ledeb. (L) Monsal Dale in great quantity and fully established. It also occurs in other places along the course of the Wye, as for example, between Bakewell and Haddon.

Lycium chinense Mill. (C) Moorwood Moor, Hardwick; (G) Wadshelf; (L) Middleton-by-Youlgreave. This species is spreading very rapidly in the hedges and on old walls throughout the north of the county.

Verbascum Blattaria L. (*P) Hardwick. [Rev. W. R. Linton placed this record of mine in the *Flora* under (C). Its situation is, however, on the Permean. I first saw it here in 1894 and found it persisting on the same spot in 1910.—E. D.]—*Veronica polita* Fr. var. †*grandiflora* Bab. (*P) Elmton.—*V. Anagallis-aquatica* L. var. *anagalliformis* (Bor.). (L) Ashford.—*Euphrasia Rostkoviana* Hayne. (P) Scarcliffe Park Wood; (*C) Wingerworth; (L) Monsal Dale, Bonsal.—*E. brevipila* Burnat & Gremli. (L) Monsal Dale.—*E. campestris* Jordan. (L) Matlock Bath. Rev. E. S. Marshall agrees with us in this determination.—*E. Kerneri* Wettst. (G) Littlemoor; (L) Crich Stand, Monsal Dale, Sheldon, Masson, Bonsall.—*E. borealis* Towns. (G) Dore Moor, Crich.—*E. stricta* Host. (*P) Scarcliffe Park Wood; (C) Brackenfield.—*E. curta* Wettst. (C) Brackenfield.—*Melampyrum pratense* L. var. *montanum* Johnst. (*G) Dore Moor. The record for this plant, "Moors above Holymoorside," given on my authority in the *Flora*, should have been placed under (G) and not under (C) as Mr. Linton placed it.

Mentha piperita L. (C) Wingerworth.—*Lycopus europæus* L. (C) Hardwick.—*Stachys palustris* L. (C) Tapton, Wooley Moor. *S. palustris* × *sylvatica* (*ambigua* Sm.). (C.) Tapton.—*Galeopsis Tetrahit* L. (*sensu stricto*). (L) Lathkil.—*G. speciosa* Mill. (G) Dore Moor.—*Lamium Galeobdolon* Crantz. (C) Tapton, Lower Hady; (G) Ashover Hay.

Plantago major L. var. *intermedia* Gilib. (*C) Brockwell, Brierley Wood.

Chenopodium album L. var. *candicans* Lam. (*C) Newbold, Ogston, Renishaw; (*L) Lathkil Dale; var. *viride* (L.) (C) Chesterfield, Calow.—var. *paganum* (R.). (*C) Newbold, Renishaw.

†*Polygonum Hydropiper* × *Persicaria*. (*C) Newbold, with the parent species.—*Rumex domesticus* Hartm. (C) Wingfield, Moorwood Moor; (*L) near Milltown.—†*R. domesticus* × *obtusifolius*. (*L) near Milltown, with the parent species.—*Euphorbia exigua* L. var. *retusa* L. (C) Eckington.

Humulus Lupulus L. (C) Spital.—*Urtica dioica* L. var. *angustifolia* W. & G. (C) Renishaw Park Wood; (L) Monsal Dale, Cave Dale, Alport.

Betula tomentosa Reith. & Abel. (C) Old Brampton.—*Quercus sessiliflora*. (*L) Lathkil Dale.

Empetrum nigrum L. Dore Moor, abundant.

Elodea canadensis Michx. (C) Hardwick Ponds.

Galanthus nivalis L. (C) Ogston Park.

Neottia Nidus-avis Rich. (P) Scarcliffe Park Wood.—*Epipactis atroviridis* W. R. Linton. (C) Foxston Wood, Brierley Wood.—*Orchis ericetorum* Linton. (G) Dore Moor.

Luzula multiflora DC. var. *congesta* Lej. (G) Dore Moor.

Sparganium simplex Huds. (C) Hardwick Ponds.—*Typha angustifolia* L. (C) Newbold.

Alisma ranunculoides L. (*C) Renishaw.—*A. lanceolatum* With. (C) Renishaw.

Triglochin palustre L. (C) Wingerworth.

Eriophorum polystachion L. var. *elatius* (Koch). (G) Dore Moor.—*Carex vesicaria* L. (*Y) Haddon; (L) Lathkil.

Phalaris canariensis L. (C) Staveley, Heath; (G) Littlemoor; (L) Alport. This plant is merely a grain-alien, and occurs only in waste places near dwellings.—*Agrostis alba* L. var. *stolonifera* (L.). (C) Brockwell.—*A. tenuis* Sibth. "var. *pumila* L." (L) Masson. This plant grows freely on the exposed limestone turf.—*A. nigra* With. (C) Calow, Dunston, Tapton, Hasland. It occurs abundantly in cereal crops.—*Avena fatua* L. var. *pilosa* Syme. (C) Chesterfield. This is the plant we recorded as var. *pilosissima* Gray in Journ. Bot., June, 1908, p. 207. Prof. Hackel has identified it as var. *pilosa* (See B. E. C. Rep. 1909, p. 481). It is certainly the common form in Derbyshire and, we believe, in England generally.—*Festuca ovina* L. var. *glauca* Hackel. (L) Lathkil Dale.—*Bromus giganteus* L. (C) Wingfield, Renishaw.—*B. secalinus* L. (*P) Cresswell.—*Brachypodium pinnatum* L. (C) Hardwick. The distribution of this grass in Derbyshire is interesting. As the Rev. W. R. Linton noted, it occurs very abundantly on the Permean; indeed, it forms a striking feature of the flora. Only occasionally does it pass on to the Coal Measures, and then for a very short distance, as at Hardwick, where the top of the hill is Permean, and the bottom Coal Measures. On the Carboniferous Limestone it is almost absent, but on Crich Stand, an inlier of this formation, there is a large patch of this grass. The floras of the Magnesian and Carboniferous Limestones have so much in common that this great difference in the presence and absence, respectively, of *B. pinnatum* is most striking.—*B. pinnatum* L. var. †*pubescens* Gray. (*P) Elmton, Hardwick.—*Lolium perenne* L. var. †*aristatum* Schum. (*G) Littlemoor.

A NEW GENUS OF *RUBIACEÆ*.

By H. F. Wernham, B.Sc.

In the course of examining unnamed material of *Rubiaceæ* in the National Herbarium, I came across the following interesting plant collected by Appun, which I regard as the type of a new genus:—

Pteridocalyx, gen. nov. Calycis tubus oblongus vel anguste infundibularis; limbi lobi 5 persistentes, quorum sæpissime unus (nonnunquam plures) in laminam foliaceam petiolatam coloratam productus, cæteri inter se subæquales angusti, rarissime omnes æquales. Corolla tubo elongato extus sericeo lobis latiusculis glabrescentibus vel sparse pilosis, stricte contortis. Stamina 5 basi corollæ inserta filamentis brevibus antheris linearibus dorso affixis. Discus annularis tumidus. Ovarium biloculare. Stylus glaber filiformis ramis 2 subcomplanatis. Ovula in loculis numerosa, placentis septo adnatis eique æquilongis. Capsula parva angusta septicide dehiscens polysperma. Semina minutiuscula reticulata areola obliqua foveolata.

Arbor v. frutex ramulis subteretibus. Folia membranacea. Stipulæ latæ deciduæ in dentibus triangularibus bifidæ. Flores inter minores in cymis unilateralibus subcorymbosis terminalibus sessiles.

The genus clearly finds a place in the tribe *Rondeletieæ*, but it is distinct from the rest of this tribe in the basal insertion of the stamens, the bifid stipules, and the combination of contorted æstivation with petaloid development of one or more of the calyx-lobes. *Pallasia* seems to be the nearest ally, but in *Pallasia* the æstivation is imbricate, and the stipules entire.

P. Appunii, sp. unica. Ramulis pube brevi densiuscula grisea indutis, foliis summis breviter inferioribus longius petiolatis elliptico-lanceolatis utrinque angustatis leviter et longe acuminatis utrinque ad venas modice aliter sparsissime pilosis supra in siccitate fuscis subtus viridioribus, stipulis latis brevibus bidentatis pilosis, cymis unilateralibus pubescentibus laxiusculis quam folia brevioribus pro rata longe pedunculatis dichotomis subcorymbosis cymulis 5–10-floris bracteis minutiusculis truncatis, calycis parvi tubo dense striguloso-piloso lobis lineari-lanceolatis venis centralibus prominentibus hirsutis lamina dum adsit ovata breviter petiolata subacuta palmatim venosa intus glabra extus ad venas prominentes pilosa, corollæ tubo gracili angusto quam lobi 2–2·5-plo longiore extus sericeo-piloso intus pubescente lobis patentibus ovatis obtusis glabrescentibus, antheris lineari-fusiformibus, capsula oblonga bisulcata a basi dehiscente appresse hirsuta calycis limbi segmentis persistentibus coronata, seminibus globosis.

Hab. Kaieteur Falls, Demerara, *C. Appun*, in Hb. Mus. Brit.

Folia 9–16 cm. × 3–5·5 cm.; petiol. summorum 5 mm., inferiorum 1·5–2 cm. Costæ secundariæ utrinque 10–12 subtus eminentes et vix arcuatæ, ut vena centralis breviter sericeo-pilosæ. Stipulæ basi 4–6 mm. latæ, 2·2 mm. longæ, dentes 1–1·5 mm. longæ. Cymæ ca. 4–6 cm. long., 3–4 cm. lat. Calycis tubus 3–4 mm. long.; segmenta minora 3–4 mm., majora 11–13 mm. long. × 7–9 mm. lat.; petiolus 2–3 mm. long. Corollæ tubus 10–11 mm. long., lobi 4–5 mm. long. × 2 mm. lat. Antheræ 2·8 mm. long., filamenta vix ·75 mm. long. Capsula 7–8 mm. long. × 1·5–2 mm. lat.

NOTE ON *LEUCOBRYUM.*

By E. M. Williams.

I came across lately in some woods near Fawley, Hants, many unattached cushions of moss. Some of these cushions were sent to a competent authority, who pronounced them to be abnormal growths of *Leucobryum glaucum*. As there appear to be but few previous records of the occurrence of these double discs of moss in England, a short description of them and of their habitat may be of interest. Hundreds of bosses, or cushions, of *Leucobryum* are to seen growing under both fir-trees and beech-trees, but chiefly under fir-trees, in the woods in question; and, on examination, a certain number of these cushions will be found to have no attachment to the ground. They lie loosely on the brown litter of pine-needles or dry leaves, and their upper and under sides show precisely the same surface of growing moss. Sometimes one side of the double disc is convex and the other flat; sometimes both sides are slightly convex. The discs vary from about 1½ in. to 4 in. in diameter, and the largest are about 1½ in. thick in the centre.

In a paper contributed to *The Bryologist* in November, 1907, Mr. Burrell attributes the unattached state of "double convex discs" of *L. glaucum* found at different times in Norfolk and Buckinghamshire to "accidental and repeated disturbance." He refers to the abnormal vitality and persistent growth of the moss, and suggests that when a cushion is detached from the ground, and left with the base turned upwards, it continues to grow in that position; he also points out that *Leucobryum* holds in its cells sufficient water to "render unattached tufts self-sustaining" for a considerable period. "The tread of woodmen and sportsmen and the removal of timber play their part," this writer says, in continually shifting the loosened discs; but it is probable, he adds, that "in well-stocked game-preserves" they are much more frequently turned over and moved by birds. The constant disturbance results in "alternating growth taking place in two different directions."

It seems impossible to suggest a better explanation of the origin of the discs than the one put forward by Mr. Burrell. At the same time, it is difficult to understand why, if the causes of their formation are so simple, and the conditions necessary to that formation are conditions which prevail in vast areas of woodland, the double discs are not more common. For about twelve weeks this summer I walked almost daily in the woods near Fawley, and saw in them immense quantities of *L. glaucum*; but only in one large stretch of woods did I find unattached cushions. I afterwards learnt that they are so well known in these particular woods that they have received the popular local name of "Fawley buns."

I may mention that I never discovered an unattached double disc with one side looking greener and more vigorous than the other; both sides always appeared to be equally active, if one may so express it. I may also mention that where one surface was convex and the other flat, the growth on the flat side sometimes appeared to radiate from a centre. It is perhaps worthy of note that the tufts of moss which I saw that had obviously been recently loosened from the ground seemed to have a tendency to fall to pieces quickly; I do not think I ever noticed a tuft lying base upwards and looking fresh and healthy; possibly the extreme dryness of the weather would account for this.

SOME PLANTS FROM LIBERIA.

Collected by Mr. R. H. Bunting.

The Department of Botany of the British Museum has recently received a small collection from the Gola Forest, Liberia, made by Mr. R. H. Bunting, which has been worked out by the officers of the Department. Mr. Bunting recently left the service of the Department to take up an appointment under the Liberian Rubber Corporation, for the purpose of exploration work in the forests of Liberia. He has sent a small but interesting collection, and it is hoped that he may find further opportunity for adding to our knowledge of the botany of the country. In his covering letter Mr. Bunting comments on the many interesting physiological and biological features presented by the forest flora. "The majority of plants have their youngest leaves coloured, their tints ranging from light yellow to purple; . . . some of the lianes bear shoots of very great length before leaves occur, and these shoots are also not green." He notes that many of the smaller trees are cauliflorous, and that hygrophytic types of foliage abound, "as might be expected in a country the average annual rainfall of which is said to be 153 inches," and epiphytes of all kinds occur in large quantity.

The collection includes the following species, some of which constitute new records for Liberia (these are indicated by an asterisk).

Polypetalæ.

Determined by Edmund G. Baker, F.L.S.

Monodora tenuifolia Benth. Distrib. Upper Guinea.

Glyphæa grewioides Hook. fil. Distrib. Upper and Lower Guinea, Uganda.

**Hugonia platysepala* Welwitsch. Distrib. Angola, Cameroons, Uganda, Sierra Leone, Togoland.

**Baphia leptobotrys* Harms. Distrib. Cameroons.

Dichrostachys platycarpa Welwitsch. Distrib. Angola.

**Dissotis decumbens* Hook. fil. Distrib. Upper and Lower Guinea.

**Calvoa sessiliflora* Cogn. Distrib. Hitherto only known from the Congo Region.

Memecylon golaense, sp. nov. Arbor glaberrima. Rami cortice griseo vel cinereo tecti teretes. Ramuli plus minus angulati. Folia parviuscula chartacea elliptica vel ovalia vel ovata basi cuneata apice in acumen attenuata apice ipso obtusa 3-nervia jugo laterali subvalido paullo supra laminæ basin abeunte et margini subparallelo inter nervos transversales haud curvato nervis transversalibus numerosis tenuibus subparallelis costæ subrectangulariter impositis nervis supra impressis subtus prominentibus venis supra vix conspicuis subtus prominulis. Flores parviusculi in foliorum axillis in cymas minimas plerumque 3-floras rarius 2–1-floras dispositi. Cymæ pedunculatæ pedunculis tenuibus.

Bracteolæ parvæ. Calycis glaberrimi tubus campanulatus limbus dilatatus ore breviter 4-lobo. Petala parva cuneato-obovata. Stylus filiformis. Bacca deest. Species ad *M. strychnoidem* Gilg accedens differt foliis minoribus, floribus minoribus, &c.

Gola Forest; fl. April. Petals dark ultramarine colour at base, shading off to white.

Arbor. Petiolus 3–5 mm. longus. Folia 4·0–6·0 cm. longa, 18–26 mm. lata. Calyx 2·5–3·0 mm. latus. Petala circ. 2 mm. longa ± 1·5 mm. lata.

Allied to *M. strychnoides* Gilg non Baker and to *M. Barteri* Hook. fil. *M. strychnoides* Baker was described in the *Kew Bulletin*, 1895, p. 105, the type being a plant from Lagos, *Millen*, no. 168, and is synonymous with *M. Milleni* Gilg, described by Dr. Gilg in 1898.

The noticeable features of *M. golaense* are the rather small 3-nerved leaves, and the small flowers in generally 3-flowered pedunculate cymes.

Begonia Whytei Stapf. Distrib. Liberia.

GAMOPETALÆ.

Determined by H. F. Wernham, B.Sc.

Oldenlandia lancifolia Schweinf. Distrib. Central and West Tropical Africa.

**Mussænda erythrophylla* Schum. & Thonn. Distrib. Central and West Tropical Africa, Uganda.

**M. elegans* Schum. & Thonn. Distrib. Central and West Tropical Africa, Uganda.

**M. grandiflora* Benth. Distrib. Sierra Leone.

Sabicea discolor Stapf. Distrib. Liberia.

Heinsia jasminiflora DC. Distrib. Upper and Lower Guinea, Mozambique.

**Amaralia bignoniæflora* Welw. Distrib. Central Africa, Sierra Leone, Angola.

**Cuviera nigrescens* comb. nov. *Vangueria nigrescens* Scott Elliott in Journ. Linn. Soc. xxx. (1894), 80; Hook. Icon. pl. xxiii. t. 2283. Distrib. Sierra Leone.

This plant, which seems undoubtedly to be a *Cuviera*, differs from Scott Elliott's *Vangueria nigrescens* only in the length of the caudæ which terminate the corolla-lobes; these in Bunting's plant appear to be longer and more setaceous in character. I think, however, that the two are of one and the same species.

**Psychotria cristata* Hiern. Distrib. Niamniam-land, Uganda, Mt. Ruwenzori, Angola.

**Geophila hirsuta* Benth. Distrib. Nigeria, Cameroons.

Voacanga caudiflora Stapf. Distrib. Liberia.

Callichilia subsessilis Stapf. Distrib. Upper Guinea.

***Crossandra Buntingii** S. Moore, sp. nov. Parvula, verisimiliter herbacea, caule superne folioso dense pubescente dein glabrescente, foliis parvis brevipetiolatis oblongis vel angustissime oblongo-ovatis obtusis basi leviter cordatis membranaceis supra appresse

strigoso-pilosis subtus in nervis pubescentibus, spicis abbreviatis paucifloris, bracteis latissime obovatis obtusissimis margine undulatis glabris quam bracteolæ lanceolatæ acuminatæ longioribus, calycis segmentis bracteolas excedentibus inter se æqualibus lanceolatis longe acuminatis omnibus similiter nervosis, corollæ tubo bracteas longe excedente lobis ovatis vel oblongo-obovatis obtusis posticis quam ceteri minoribus, antheris apicem versus tubi insertis.

Hab. Liberia, swamps in Gola Forest, six miles north of Barway town.

Folia solemniter 3–6 cm. long., 1·5–2·5 cm. lat., subtus pallidiora, margine leviter repanda; petioli summum 7 mm. long., dense pubescentes. Spicæ (corollis exemptis) 1–2·5 cm. long. Bracteæ circa 1 cm. long., apicem versus totidem lat., virides; bracteolæ ægre 8 mm. long. Calycis segmenta 12 mm. long., omnia nervo centrali et utrinque tribus aliis minus distinctis percursa. Corollæ tubus fere 2·5 cm. long.; lobi postici 9 mm., reliqui 11–13 mm. long. Filamenta 2 mm., antheræ 3 mm. long. Ovarium oblongum, 3 mm. long. Stylus inclusus.

This is a remarkable and very interesting plant, since its nearest affinity is with *C. Boivini* S. Moore from Madagascar. This latter, because the segments of its calyx are almost similar, Baillon referred to *Stenandrium*, an American genus, and the importance of *C. Buntingii* is due to this, that its calyx-segments being absolutely similar *inter se*, it is a native of Western Africa, and so forms a geographical link between the Stenandriums and the Madagascar plant just mentioned. *C. longipes* S. Moore is a connecting link between these two species and the ordinary Crossandras of Africa and Madagascar, inasmuch as it has an entire and not bifid posticous segment. These facts point to the conclusion that *Crossandra* and *Stenandrium* are really only one genus. The pollen, it may be added, of *C. Buntingii* is normal.—S. M.

**Physacanthus cylindricus* Clarke. Distrib. Gaboon.

Clerodendron splendens G. Don. Distrib. Upper and Lower Guinea.

APETALÆ.

Among the *Apetalæ* were several species of *Ficus*, of which the material was inadequate for identification, and also **Loranthus parviflorus* Engl., hitherto recorded only from French Guinea and Sierra Leone.

MONOCOTYLEDONS.

Determined by A. B. Rendle, F.R.S.

**Orestia elegans* Ridl. On humus of damp rocks, Gola Forest; May. An interesting addition to the African continental flora; this monotypic genus being previously known only from one locality in the island of St. Thomas.

**Eulophia ciliata* Reichb. f. (*E. gracilis* Lindl.). River-bank, Jui, Gola Forest; April. Distrib. Sierra Leone, Liberia.

**Brachycorythis pumilio* Reichb. f. Side of path, Jui, Gola Forest; April. Mr. Bunting found one specimen only of this rare and interesting little species; it is two inches high, and bears a single flower. There are only two previous records of this species—the original specimen found by Mann in Sierra Leone, and a specimen found, according to Reichenbach, by Mechow at Malange, in Angola. I am, however, informed by Dr. Schlechter that *Schwartzkopffia Buettneriana* Kranzl. (in Engl. Jahrb. xxviii. 177), described as the type of a new genus on a specimen from Togo, is identical with *B. pumilio*. I have not seen a specimen of *Swartzkopffia*, but the description bears out the suggestion of identity.

**Gymnosiphon squamatus* Wright. Swamp, three miles north of Gelti River; June. Distrib. Cameroons, Gaboon.

**Buforrestia imperforata* C. B. Clarke. Damp rocks, Gola Forest; May. Sierra Leone, Cameroons, Congo, and Angola; also in Usambara.

Mr. Bunting also sends *Commelina nudiflora* L. and *Aneilema ovato-oblongum* Beauv., both from Jui.

**Limnophytum obtusifolium* Miq. Wet places, Jui; April. Distrib. Widely spread in Tropical Africa.

A NEW *ÆOLANTHUS* FROM THE CONGO.

By H. F. Wernham, B.Sc.

The following striking species came before my notice in the course of dealing with various *Labiatæ* in the National Herbarium. It is recognizable at once by its almost scabrid leaves and by the long purple hairs with which the densely spicate inflorescence is clothed:—

Æolanthus purpureo-pilosus, sp. nov. Herba 3–5 dcm. alt., caule erecto sparse hirsuto profunde canaliculato, foliis paucis petiolatis ovato-lanceolatis obtusis margine obscure crenato subscabrosis setis subtus nonnullis super vena præcipua, cymis dense purpureo-pilosis in spicis densis ramos nudos sublongos terminantibus, bracteis persistentibus obovato-lanceolatis obtusis pilis subtus articulatis filamentosis dilutis purpureis sæpissime marginem versus insertis, calyce parvo brevi-campanuliformi obsolete bilobo extus sparse piloso, corollæ tubo curvato labiis subæqualibus integris concavis, nuculis glabratis valde compressis, calyce in fructu accrescente et desuper concrescente in pileolo deciduo.

Hab. Luisi Flun, Congo; *Kässner*, 2677.

Folia 3·5–4·5 cm. × 1·6–2·6 cm.; pedicella 4–8 mm. long. Bracteæ 5 mm. long. × 2 mm. lat. Calyx in flore 1 mm. long., in fructu 3 mm. long. (pars decidua 2 mm. long.). Corollæ tubus 6–7 mm. long., labia 5 mm. long. × 2·5 mm. lat.

SHORT NOTES.

Orchis pallens in Hants.—In May, 1910, a single plant of *Orchis pallens* appeared on a rough grass bank in the grounds of East Hill, Liss. It came up again this year but did not flower; the leaves, however, looked strong and healthy. The Hon. Mrs. Cardew, who has lived at East Hill ever since the grounds were laid out, and also her head gardener, who made the bank forty years ago, both state that nothing to their knowledge has ever been planted there. The only material brought from outside the grounds to make the bank was some chalk from the hills about six-and-a-half miles distant. The following description of the plant is translated and condensed from Schulze's *Die Orchidaceen Deutschlands* (1894), no. 14:—"Tubers large in proportion to the plant, ovate or longish, seldom globular, with rather strong rootlets. Stem 20–40 cm. high, terete or slightly angular, glabrous, light green, with short, pointed, nerved scales below, leafless above. Leaves broadly or narrowly obovate, somewhat narrowed below, broadest above the middle, bluntish or somewhat pointed, rather fleshy, of a beautiful clear green, unspotted. . . . Spike oval, nearly cylindrical, with rather large, rather loose, pale yellow flowers, nodding as a rule, with a very disagreeable scent, especially in the evening and night. Bracts as long as or longer than the ovary, linear-lanceolate to ovate-lanceolate, pointed, 1-nerved, rarely 3-nerved, pale yellow, with scarious margins. Ovary sessile, linear, twisted, light green, curved at the top. Outer perianth-segments free, ovate, blunt, 1–3-nerved, pale yellow or yellowish-white. . . . Lip broad, longer and not so pale a yellow as the other perianth-segments, directed forwards and downwards, slightly convex, shallowly 3-lobed, entire or slightly notched, especially in the middle or towards the base; more or less velvety with short papillæ; side lobes rounded or almost cut short; middle lobes larger than the side lobes, undivided. Spur cylindrical, blunt, seldom emarginate at the apex. . . . Column short, very obtuse or shortly pointed, pale yellow; pollen-masses pale yellow, their stalks and glands whitish." Nyman (*Conspectus*) gives its European distribution as follows:—"Germ. med. (præc. Thuring.) mer. Helv. Delph. Ital. Cont. (in centr. et mer. r.). Austr. Hung. Banat. Trauss. Croat. Vallach. Bosn. Herceg. Alban. Attica? (Hymettus: Fraas). Messen. (ex Boiss.)."—R. M. Cardew.

Carex aquatilis Wahl.—It does not appear from Mr. Ewing's note on pp. 301–2 that he has seen a dried specimen of the gathering (my No. 3472) from the bog between Ben More and Am Binnein, v.-c. 88 Mid Perth, which I have named and distributed as *C. aquatilis* forma (misprinted "former" on p. 196) *angustata* Kükenthal. This is very nearly identical with my Nos. 2103 (by the Spey, below Kingussie, 96 E. Inverness, July, 1898) and 2983 (Corrie Kander, 92 S. Aberdeen, at 2800 feet, July, 1906), both of which are referred by Pfarrer Kükenthal to his f. *angustata*. I can see no difference, beyond the smaller size, narrower leaves, and more slender spikelets, between any of these three and our ordinary *C. aquatilis*, which grows plentifully in the marsh at the head of Loch Dochart, below Ben More; nor any approach whatever to the Forfarshire *C. rigida* var. *inferalpina* Laest., which was, I think, originally identified by Mr. Arthur Bennett, and has been confirmed by Kükenthal. Mr. Bennett remarked on No. 3472:—"I am glad to see this; I had not seen a specimen before. As I expected, simply a reduced form" [*i.e.* of *C. aquatilis*]. I may remark in passing that there is usually, if not always, a considerable gap between the Scottish lowland stations of *C. aquatilis* and the alpine ones; this species being quite absent from the intermediate tracts. I know nothing of *C. rigida* var. *limula*; but I believe that Kükenthal considers *C. limula* Fr. to be a hybrid between *C. Goodenowii* and *C. rigida*. By an unaccountable error Mr. Dixon's name has been substituted for Mr. Druce's on p. 196.—Edward S. Marshall.

REVIEW.

The Botanical Exchange Club and Society of the British Isles. (*Balance Sheet*; *Secretary's Report for 1910.*) Report for 1910 by the Editor and Distributor, C. E. Moss, B.A., D.Sc., F.R.G.S., The Botany School, Cambridge. Vol. 2. Published by James Parker & Son, 27 Broad Street, Oxford. 1911. Price 5*s*. [Pp. 489–610.]

We transcribe the above from the wrapper of the work before us, as it gives more information than appears upon the title-page. So many changes have been made during the last few years in what used to be a modest record bearing exclusively on plants submitted by members that we are prepared for almost any development which may suggest itself to Mr. Druce, the indefatigable "Treasurer and Secretary"; yet it comes to us with a certain shock of surprise that even the title which has obtained for so many years has been changed, and that the Botanical Exchange Club has become also a "Society of the British Isles"! We look in vain in its pages for information as to this Society. Something of the sort was proposed, we think, some time back by Mr. Druce, but we were not aware that it had taken shape, and one feels a natural curiosity as to its origin and organization, for even the most energetic of men can hardly create a "society" by his own unaided efforts. A society usually possesses officers, and if we assume, as we reasonably may, that Mr. Druce's connection with the Exchange Club entitles him to be considered the Secretary and Treasurer of the newly developed body, it would appear that it is still acephalous if not amorphous. Mr. Druce seems to be the only person who can tell us more, and, as the matter is naturally of interest to British botanists in general, we are a little surprised that, amid the wealth of information which appears in the Report, no reference is made to the new departure. It would seem moreover from a note, which we think is by Mr. Druce, on the last page of this issue that a further departure from the original plan of the Report which was adhered to for so many years is in contemplation. We read that "next year, which commences another volume of the 'Reports,' it is proposed to introduce a new feature, which will give experts additional time to make their criticisms, and by which they will have all the details before them, and which at the same time will save much correspondence relating to the issuing of the Report. Therefore the Secretary suggests that with the return Parcels shall be included the printed Report, which will consist only of the yearly Review and a full list of the Plants, with the explanatory notes supplied by the Contributor. The following year (1912) will consist of 3 parts, (1) the Review for 1912, (2) the Criticisms of the experts on the plants distributed in 1911, and (3) the list of plants sent in 1912." We confess our inability to understand exactly what is contemplated, but we presume that the Secretary's "suggestion" is equivalent to a declaration of policy, so must be contented to "wait and see."

In the Report before us, forty pages are occupied exclusively by Mr. Druce's notes. Mr. Druce also seems to have exercised a general supervision over the remainder, which is copiously annotated by him: it is edited by Dr. Moss, who contributes many notes of special interest—e. g. those on *Salicornia*; other notes are added by the referees and by the senders of specimens. Mr. Druce's portion includes what appears to be a useful summary (which, if space should allow, we hope to reprint) of the not quite recent researches on *Utricularia* of Dr. Hugo Glück (1902) and Fr. Meister (1900). The notes vary considerably in value; many relate to records "in lit." of aliens whose identification does not appear to have been vouched for by a competent botanist. The numbers prefixed to each name apparently refer to Mr. Druce's *List*, though this is not stated, nor are we told the meaning of the often-prefixed asterisk; if this indicates an addition, one may be allowed to regret that it should be swelled by such plants as *Lycopus europæus* var. *dissectus* Stokes, which "apparently grades imperceptibly into the type." Other varieties with little or no claim to distinctness have been exhumed from various quarters wherein they might well have remained undisturbed; we fail to see the gain (apart from that of making a new combination) of adding to the British list such things as:—

"MELILOTUS OFFICINALIS, Lam., var. UNGUICULATA, Seringe, ms., DC. 'Prod.' ii. 187, 1828 (*sic*) = leguminibus elongatis sterilibus unguiformibus pedicellatis. Oxford.

"M. ALBA, Desv., var. UNGUICULATA (Seringe, in DC., 'Prod.' ii. 187, 1825, under *M. leucantha*), leguminibus elongatis sterilibus unguiformibus pedicellatis. Oxford."

Making all deductions, however, Mr. Druce's section of the Report contains much interesting matter, though misprints are rather numerous, and includes descriptions of the following apparently new forms:—

"RANUNCULUS BULBOSUS L. var. DUNENSE Druce. Planta

5–10 ctm. alta. Radicibus plurimis ad perpendiculum directis. Cormo robusto, vaginis veturum foliorum dense cooperto. Folia capillis longis albis hirtis densius vestita, præcipue petiolis. Pedunculi breviores 3–5 ctm. Flores magni 2·5–2·8 ctm.

"Near to *R. valdepubens* Jord., of which it may be a dune-form. Differs from *R. bulbosus* by its shorter growth and larger flowers, its corm being densely clothed, and the leaves and petioles being covered with long shaggy hairs. Sand dunes, St. Ouen's Bay, Jersey, April, 1910."

"CRATÆGUS OXYACANTHA L. var. QUERCIFOLIA Druce. Styl. i. Calyces et pedunculi densius hirsuti; foliis pallide virentibus pubescentibus, in textura molliter—papyraceis, rhomboidis ad bases late cuneatis; foliorum marginibus in 5-7 segmentis inequaliter divisis, segmentis obscure et diverse crenatis; ramis floriferis contortis. Kirkcudbright."

"GALIUM PALUSTRE L. var. SERRULATUM. Planta 45 ctm. alta; caule glabro. Folia parva in verticillis 5–6 foliorum ipsa anguste lanceolata 5–8 mm., margine minute serrulata. Ramis floriferis divaricatis. Near Sandford Mill, Berks, 1910."

"GALIUM PALUSTRE L. forma ANGUSTIFOLIA. Planta 20–30 ctm. alta, caule tenuo, verticillis 5 vel 6 foliorum. Folia parva 5–8 mm. longa 1–2 mm. lata, anguste lanceolata, glabra, margine integra. Rami floriferi diffusi divergentes. Near Marsh Gibbon, Bucks, 1910."

With regard to the first of these, it is to be noted that Mr. Marshall, on p. 538 of the Report, has the following note:—"The material sent to me is too young to base any valid opinion upon; as far as I can judge, it is nothing but a state due to the situation. Cultivation *may* prove the characters to be permanent. Rev. H. E. Fox has sent specimens to the Watson Exchange Club which appear to be just the same thing."

Viola Riviniana Reichenb. var. *diversa* Gregory is indicated but not clearly defined. Mr. Druce's portion of the Report also contains bibliographical and biographical notices.

The second portion, edited by Dr. Moss, is more definitely concerned with the actual work of the Club, and contains many notes of considerable interest, to which most of our British botanists contribute. It also affords the usual evidence of differences of opinion between capable botanists—sometimes (*e.g.* the *Barbarea* from a brickyard (p. 539)) the result of "poor material" hardly worth wasting time upon. We hope later to quote some of the more interesting notes at length; meanwhile we see that *Campanula persicifolia*, the occurrence of which in very small quantity in Gloucestershire was recorded some time since—we observe that Mr. Druce says that "the locality is destroyed," but that can hardly be—has made its appearance on a common near Newbury, where *Euphorbia Cyparissias* is also found, although not with the *Campanula*; that *Juncus tenuis* has occurred in Ayrshire (see Journ. Bot. 1910, 259); that *Spartina Townsendi* has recently been found on the French coast opposite Hampshire; that *Hierochloe borealis* has occurred on the Kirkcudbrightshire coast, in very small quantity; and that *Claytonia perfoliata* is "naturalized under Scots pines for two or three miles along the boundary of Suffolk and Cambridgeshire."

BOOK-NOTES, NEWS, &c.

THE "Plant Protection Section" of the Selborne Society, of which Dr. Rendle is President and Mr. A. R. Horwood Recorder, has issued two appeals—one to "Nature study teachers" and one to the general public. The former are asked to aid in "an appeal to children (and through them to their parents)" to respect certain Rules which seem to us drawn up for the teachers themselves rather than for their pupils: the latter are urged "to abstain from needlessly uprooting or damaging wild plants; to discourage this spirit of selfishness in others; and to inform the County Council authorities and the Selborne Society of the wholesale uprooting of plants for commercial purposes, due to the mercenary spirit of dealers who employ hawkers to strip the countryside of its treasures." "It is hoped that, before long, local orders making it illegal to hawk wild flowers in the streets, or to collect them in quantities, will be enforced by all County Councils. In the meantime the Selborne Society asks the public to support its efforts by discouraging all actions which tend to impoverish the flora and fauna of the country."

THE thirtieth volume of the Journal of the College of Science of the Imperial University of Tokyo contains *Materials for a Flora of Formosa* by Mr. B. Hayata, supplementary to the *Enumeratio Plantarum Formosanarum* (1906) and the *Flora Montana Formosæ* (1908) published in the same Journal. The fact that in so short a period additional material has accrued sufficient to occupy a volume of nearly eight hundred pages is evidence that the investigation of the botany of the island is being prosecuted with remarkable energy by the Government of Formosa. A large number of recent collections from the mountainous regions, containing a considerable number of novelties, form the basis of the present volume, to which the author prefixes an interesting introduction dealing with certain critical species described in his former volumes. The total number of the plants of the island is 2660 species belonging to 836 genera and 156 families. The present volume was prepared by the author at the Kew Herbarium, with some assistance from the staff.

THE first volume of Dr. Trow's *Flora of Glamorgan* has been "completed" (but there is no index!) by the issue of the fifth section, which contains the Monocotyledons and vascular cryptogams. Each plant, we note, has a "Welsh name" which in many if not in most cases is obviously manufactured—*e.g. Carex rostrata*, "Hesgen chwysigenaidd ylfinfain"; *C. vesicaria*, "Hesgen chwysigenaidd berdywysennog." "It is proposed to issue a second volume, in which the geographical distribution, œcology, and 'critical' species and varieties will receive fuller treatment than was possible in vol. i."

THE GREWIAS OF ROXBURGH.

By J. R. Drummond, B.A., F.L.S.

The genus *Grewia* has not been monographed as a whole* since 1804, when A. L. de Jussieu reviewed it in the *Annales du Museum National d'Histoire Naturelle* (iv. pp. 82–93). He there enumerated thirty-three species, of which four were admittedly imperfectly known: in several other cases he appears not to have been acquainted with the plant, and had to rely on previous writers for an account of it.

In the *Prodromus* (i. 508–512) De Candolle (1824) followed Jussieu's arrangement rather closely; he reduced one of the species of the *Memoire*, but added twenty-one new ones, chiefly from the works of Roth † and of Roxburgh, making fifty-three in all. At the same time he noted that in the Catalogue of the Calcutta Garden (*Hortus Bengalensis*) Roxburgh had published in 1814 several other species, but without descriptions, and some of these De Candolle apprehended might turn out to be identical with species independently described by other authors.

After Roxburgh's death, his account of the Indian Grewias, so far as he knew them, was published by Carey (1832), but in this case, as with most of the large genera, what we have in Carey, valuable as it is, does not after all present the text that we should have possessed had Roxburgh lived to be his own editor.

For example, in 1802 Buchanan had sent to Roxburgh from Nepal seeds of a tree which flowered at Sibpur in the spring of 1808, and this appears in the *Flora Indica* as "*Grewia oppositifolia* Buchanan." This tree is certainly allied to the *Grewia* which Buchanan had originally styled *oppositifolia*; that was collected in Mysore, as appears from a specimen in the Botanical Department of the British Museum, and it is in fact the species described by Wight and Arnott (Prod. Fl. Pen. Ind. Or. p. 79) as *G. emarginata*; the two species, however, are distinct, and their geographical areas, so far as we know, altogether separate. From a note by Sir J. E. Smith on a specimen of the Nepal "*oppositifolia*" in his herbarium, collected by Buchanan at Simbu, May 18th, 1802, it appears that the original (Mysore) *oppositifolia* was named and described in the lost appendix to the *Mysore Journals* mentioned by Prain at p. xli of his *Sketch of the Life of Francis Hamilton* (*once Buchanan*). Smith's note in question cites Buchanan's work as *Plantæ Carnaticæ*; it was doubtless proposed to publish it under this title.

The Court of Directors of the East India Company decided to make over the Mysore collections to Smith (v. Prain, *l. c.*), but this evidently was not carried out, at least fully; otherwise the type of the original *G. oppositifolia* (i. e. *G. emarginata* Wight & Arnott) would not be, as it is now, at the British Museum. Whether the erroneous identification rests with Smith or with Buchanan, we need not enquire; it is very possible that Buchanan sent the name with the seeds, but there is nothing to show that he did, and it may have reached Roxburgh through a quite different channel.

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* For the African species, see M. Burret in Engler Bot. Jahrb. xliv. 198 and xlv. 156 (1910).

† *Novæ plantarum species Indiæ Orientalis*, Halberstadt, 1821. The material was mainly furnished by Heyne and other Tranquebar missionaries from South India.

In this instance Roxburgh's editor was justified, according to his knowledge, in following the text; but under the next species he has piously embalmed what was manifestly a mere error of transcription. From the *Hortus Bengalensis* and the unpublished drawing (tab. 1859), it is evident that Roxburgh meant to write "*sclerophylla*" and not "*scabrophylla*," and the due citation is *Grewia sclerophylla* Roxburgh ex G. Don, Gen. Syst. i. p. 550 (1831), where the name, though taken from the *Hortus Bengalensis*, is supported by a description. These instances will serve to show that it is vital, in the case of large genera, when dealing with Roxburghian names and accounts of plants, to get at the basis of his work as far as possible; they will subserve another end later on—but the present purpose is to emphasize certain points already outlined by the late C. B. Clarke in the preface to his reprint of the 1832 edition of the *Flora Indica* (Calcutta, 1874), which may be thus summarized:—

(1) We should always assume that Roxburgh had a good knowledge, so far as his material went, of the species he included in his original notes and illustrations, though he may have only known the living plant from a garden example.

(2) The names which appear in the 1832 edition of the *Flora Indica* are not necessarily those that he would have ultimately published.

(3) These were often given tentatively, subject to revision by some correspondent, whose determination was possibly never received, or is now irrecoverable.

(4) Where names communicated by his friends or correspondents were adopted by Roxburgh, it does not follow that their determinations were correct in themselves, or that Roxburgh always personally agreed with them.

It is not possible within the limits of the present paper to deal with the Indian species of *Grewia* exhaustively; the immediate aim is to place on record certain matter that can usefully be published without waiting for the fruits of further study, while the writer still has at his disposal important collections which must shortly be returned to those who have most kindly made them available, particularly sets belonging to Mr. J. S. Gamble, F.R.S., and the fine material lent from the Madras Herbarium through the good offices of Mr. Barber.

With the third species of the *Flora Indica*—*G. pedicellata*—we need not now concern ourselves, as it was admittedly an exotic. Further, No. 4, *lanceæfolia*, can be left until we arrive at No. 16, *didyma*. The fifth species was identified with *G. excelsa* Vahl

(*Symbolæ*, i. 35), an identification which inspection of the type of Vahl's *excelsa* shows to have been perfectly erroneous. The true *excelsa* was a tree discovered by Forskâl in South-west Arabia, and described in the *Flora Ægyptiaca*, p. 105 (1775), as *Chadara arborea*, but subsequently lost sight of until 1887, when it was found again in the same country by M. Deflers, and described by him, in the belief that it was new to science, in Bull. Bot. Soc. de France, xlii. p. 301, as "*Grewia dubia.*" This tree, however, must be called *G. arborea* Lamarck, as it was duly described under this name in the *Encyclopédie Methodique*, iii. 45 (1789), two years before the appearance of the *Symbolæ*. Roxburgh's "*excelsa*" was a plant from Eastern Bengal, of which something will be said later, the present point being that the "*excelsa*" of Masters in the *Flora of British India*, i. 385, is not *G. excelsa* Vahl at all, but is certainly in part the plant published as "*G. salvifolia* R." in the *Flora Indica*, ii. 587 (Carey's 1832 edition), which again = *Grewia Rothii* DC. (*Prodromus*, i. 509, sp. 13), i. e. *Grewia bicolor* of Roth, Nov. sp. p. 420, but not of Jussieu.

G. salvifolia Heyne (ex Roth, Nov. Sp. 239) is a distinct species, as Roth duly indicated; Heyne seems in the first instance to have referred it to the *Grewia salvifolia* of the younger Linné (Suppl. p. 409, 1781), which is an *Alangium*, but it was ultimately sent to Europe as "*G. lævigata*" (of Rottler, MSS. non Vahl). Roxburgh (MS. note in Hb. Kew) referred to this *salvifolia* of the younger Linné the *other* species (which is *G. Rothii* DC.), observing at the same time that the leaves did not square with the description. His specimen at Kew has a further label "*G. glabra*," manifestly referring to the *G. glabra* of G. Forster; of this there is an authentic specimen in the Kew Herbarium, which is unmistakably *G. Rothii* of De Candolle. The pseudo-*Grewia*—really an *Alangium*—of the younger Linnæus was sent to Europe by the missionaries (see a specimen at Kew) as "*Grewia montana*"; the mistake was pointed out by Roxburgh (Fl. Ind. ed. Carey, ii. 503), but so succinctly that the clue was missed by Wight and Arnott (*v.* footnote to p. 78 of Prodr. Fl. Penins. Ind. Or.). At the same time they have clearly and correctly indicated that the *salvifolia* of Roxburgh in the *Flora Indica*, as his unpublished tab. 225 demonstrates, is *G. Rothii* DC., and further that Roth's (*i. e.* Heyne's) *salvifolia* (1821) is the *G. Damine* of Gaertner (*De Fructibus*, ii. 112, t. 1067, ann. 1788). The names and synonymy, as well as the descriptions of "*G. excelsa*" and "*G. salvifolia*" in Fl. Brit. Ind. (i. 385, 386) must accordingly be set aside; it is unnecessary to give fresh descriptions in this paper, because Roth's are full and accurate, and all that needs to be repeated here is that Roth's nomenclature has to be amended as follows:—

(1) G. BICOLOR Roth, non Juss., = *G. salvifolia* Roxb. Fl. Ind. ii. 587, non Linn. fil., = *G. glabra* G. Forster MS., = *G. Rothii* DC. Prodr. i. 509 (1824).

(2) G. SALVIFOLIA Heyne ex Roth, non Roxb., = *G. Damine* Gaertn.

Gaertner's description and figure were founded on fruits sent from Ceylon, from which island an example of this species is extant at Kew, duly referred to *G. salvifolia* Heyne ex Roth in a pencil note by Planchon. Although Gaertner had only the fruit of "*G. Damine*" before him, his description, framed to distinguish it from his *G. Mallococca*, taken with the figure, is sufficient for the identification of the species. The specific name is based on a vernacular title given comprehensively to different Grewias from ancient uses of their wood in making bows, spearshafts, and the like; in North India it is usually applied in the form "dhămmăn" (pronounced "dhummun") to *G. oppositifolia* Roxb., or to *G. elastica* Royle.

The next species of the *Flora Indica*—No. 6, *G. orientalis* Willd.—requires a notice to itself; all that can be said here is that while Roxburgh was justified in citing Rheede's figure of "Pai-paroe" for his own "*orientalis*" (leaving Willdenow for the moment out of consideration), the original citation of the same figure in Sp. Pl. ii. 964 was entirely misleading, for Linné expressly based his "*orientalis*" on types that are to be seen in Hermann's Herbarium, three of which are *G. columnaris* Smith, while one is *G. emarginata* Wight & Arnott; none of the four represent the plant of the *Hortus Malabaricus* or even faintly resemble it. Rheede's "Pai-paroe" was in all likelihood the species that was sent by Roxburgh to Smith as "*G. Microcos*," which is the type of Roxburgh's (not Linné's) "*G. orientalis*."

Smith was well aware of the trap thus provided for the unwary, but he deliberately left it open, and even added a lure by suggesting in his own herbarium and in that of Linnæus that a plant which is most likely the "*commutata*" of De Candolle (Prodr. i. 511, no. 32) was "*Grewia pilosa*." *G. pilosa* Roxburgh and a host of futile synonyms are the fruit of this regrettable proceeding, but the original "*pilosa*" of Lamarck (Poiret in *Encyclopedie*, iii. 43 (1789)) is a mere synonym of the true *orientalis* of Linné, founded on an error which was tacitly admitted and substantially, though not avowedly, corrected by Poiret in 1811 (Suppl. ii. 845).

G. pilosa Roxburgh will have to be discussed later on, but, in any case, the name "*pilosa*" should be finally excluded from use under this genus.

This brings us to the seventh species of the *Flora Indica*, *G. asiatica*, which is happy in having no pre-Linnean history. The type was gathered in a garden at Surat by Christian Henrik Braad (1728–1781), a supercargo in the service of the Royal Swedish East India Company, a correspondent of Linnæus, and probably a member of the Kongl. (pr. Svenska) Academie of Stockholm, to the *Transactions* of which he contributed two papers, one "On the Coffee Plantations and Commerce of Yemen or Arabia Felix" (Handlingar, 1761, pt. iv. p. 252); the other "On the Sago Palm and the food prepared therefrom" (Handlingar, 1775). Braad's label is attached to the Linnean specimen; the upper part is manifestly in his handwriting, and runs, "No. 1. har små röda sura bär, hvad kallas det efter species plant." The interpretation (for which and for much other assistance the writer is indebted to Dr. B. Daydon Jackson) is, "has small red sour berries. What is it called according to *Species Plantarum*?" Underneath Linné has written, "*Grewia* ——." This plant was duly published in 1768 in the *Mantissa* (p. 122) as *G. asiatica*, with a description which can leave no question that what Linné described was the cultivated "Phálsa." Willdenow (ii. 2, 1166) substituted Vahl's description for that of the *Mantissa*, and added a citation from Sonnerat's *Itinerary* (ii. p. 191, t. 138). Sonnerat had seen his example in a garden at Pondicherry; he gives the vernacular name as "Phalse," and his figure is an unmistakable likeness of the garden "Phálsa" of some parts of India. At the British Museum is a specimen obtained for Banks by Hove in Guzerat (at Surat very likely), named "*G. asiatica* Phalse." Jussieu, in the Monograph already quoted at p. 92, describes "*G. asiatica*" from Sonnerat's Coromandel gathering, and notes that the fruit is shaped like a cherry, reddish, and subacid; the tree is called "False." In the Kew Herbarium are specimens gathered in the Botanic Garden at Pondicherry by Perottet, who believed he had seen the same species "wild" in the Coimbatore neighbourhood. He was thinking possibly of *G. rotundifolia* Juss. These, as well as similar examples from Ceylon (C. P. 3785) and the Mauritius, in certain respects approach *G. sapida* Roxb.; it may here be said that *G. sapida* is the nearest Indian ally of *G. asiatica*, also that the true *asiatica* has never been seen, and is never likely to be seen (in India proper) out of a garden. The contrary persuasion, which has led to much confusion, is due to Roxburgh's having hazarded a guess as to the origin of *G. asiatica* (Fl. Ind. ii. 586), where he says "a native of various parts of India and often cultivated in gardens." There is a sheet in the British Museum herbarium which shows what Roxburgh supposed to be the "wild state" of *asiatica*; it is a mere scrap, but seems near *G. elastica* of Royle; in any case it is perfectly distinct from the main specimen, which is true *asiatica* Linn.

It cannot be too clearly understood as regards *G. asiatica* L. on the one hand, and the group of *G. tiliæfolia*, *G. vestita*, and their allies on the other, that this is not a question of varieties or "segregates." Whatever view may be held as to the value of the different species that have been proposed within the group of *tiliæfolia* Vahl. (e. g. *vestita* and *elastica*); all of these are marked off from *G. asiatica* by clear and generally constant characters, to ignore which would be bringing back chaos. It is beside the question to argue that *G. asiatica* does not occur, so far as our present knowledge goes, spontaneously anywhere. The "Phálsa" is found chiefly, if not solely, in the gardens of Muhammedans or foreigners, and there are examples from North-western India of a so-called "Phálsa," which is certainly not true *asiatica*, and may be a substitute for an exotic species, the original home of which remains to be discovered. Karl Schumann (*Notizblatt des Konigl. Bot. Gart. und Mus.* iii. pp. 99–102) has made certain very pertinent remarks on *G. asiatica*. He observes, as Vahl had pointed out before, that no one who had ever seen the true *asiatica* could miss the striking character afforded by the length of the peduncles of the flowering-cymes in proportion to the pedicels, a character which in this group, however, it must be remembered, is shared with *G. sapida*. Schumann further notes, accurately, that *G. asiatica* is not known as a native from any part of Africa, its nearest ally being, possibly, a plant found by Mr. Scott Elliot (see his No. 5277) in South-western Nigeria covering the laterite plateau over a considerable area, described by Schumann as *G. lasiodiscus*. A scrap of the same species is preserved at the British Museum, gathered about a century before by Mungo Park in the same region. From the whole group of "*tiliæfolia*" and its allies, *asiatica* differs in that it is not properly a tree, but like *G. sapida*, *G. sclerophylla*, also *G. herbacea* of Hiern, and some other African types, it sends up quickly-growing subherbaceous shoots from a short perennial trunk periodically. In *asiatica*, as grown in Northern India, the perennial trunk forms a stout stem, sometimes attaining 3–4 feet in height and 8 or more inches in thickness, and the arching branches, which bear leaves arranged bifariously and proportionately very large, are not necessarily renewed annually, as is said to be the case with *sapida*. From all forms of *sapida*, *asiatica* can be at once distinguished by the base of the leaf, which in *asiatica* is always more or less cordate, whereas the leaf-base in *sapida* is invariably cuneate. Other discriminating characters, it must be confessed, are hard to establish. In order to put this troublesome matter on a clear footing, we will for the present skip the Roxburghian species * 8 *bis* and 9, which belong to a distinct section of the genus, and consider No. 10, *G. tiliæfolia*. Roxburgh's description of this does not fit the true plant of Vahl properly, and it seems very possible that he had but slight acquaintance with that species which is characteristic of the extreme south of the peninsula. Wight and Arnott (Prodr. p. 80) say: "Most authors proceed on the supposition that Roxburgh's *G. arborea* is distinct from *tiliæfolia*, but Roxburgh only called it so before Vahl's description reached him, when he adopted Vahl's name both in his Hort. Bengh. and Fl. Ind." They have already cited Roxburgh's unpublished drawing No. 227, which was originally marked as *G. arborea*, for their *G. tiliæfolia*, i. e. Vahl's.

The first thing to be noted is that tab. 227 was obviously based on more than one specimen, and although the twig in the centre might pass for Vahl's *tiliæfolia*, the drupes on the right below it almost certainly belong to something different; whether we regard that something as a separable species or not, it certainly is not typical *tiliæfolia*. In the Madras Herbarium there is a suite of specimens collected by Mr. Barber towards the summit of a hill near Vizagapatam, presenting a type closely allied to *G. asiatica*, and not improbably = *G. subinæqualis* of De Candolle (*Prodromus*,

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* By some oversight *oppositifolia*, which stands actually first in the *Flora Indica*, bears the same number, 8.

p. 511); the writer suspects that this may have been in part the "*arborea*" of Roxburgh, but as Mr. Barber's plant was a low shrub analogous in habit to *G. sapida*, it is out of the question to make any definite assumption on the subject. There is a small tree, said to be plentiful in the Sewalik region from the Jamna to North-west Bengal, which has drupes closely resembling those in the drawing of "*G. tiliæfolia*," but the writer can find no sufficient proof so far that this form was ever seen by Roxburgh. "*Arborea*" as a name for any of the *asiatica-tiliæfolia* group could not stand in any case, for it is appropriated, as already stated, to the true "*excelsa*" of the *Symbolæ*.

The practical deduction is that, while the *tiliæfolia* of the *Flora Indica* was meant to include Vahl's species, it included at least one other form. We cannot be sure that it covered only one other, and, if only one, we are at present in the dark as to its identity.

To return now briefly to *G. asiatica*. Roxburgh had seen the true Linnean plant, but under this again the *Flora Indica* merges at least two distinct forms, as indeed the description might have led us to expect; in any case, there are Roxburghian examples of "*asiatica*" from the Calcutta Garden in the Kew Herbarium that are plainly referable to a distinct form which the writer supposes to be the *subinæqualis* of De Candolle.

As regards *tiliæfolia*, the substitution by Roxburgh of Vahl's name for his own "*arborea*" will not bear the stress which Wight and Arnott's remarks would lay upon it. If we had the letters which Roxburgh received from his mentor in England we should probably attach much less importance to these amendments than has sometimes been assigned to them.

Assuming then that the Calcutta Garden *asiatica* is to be distinguished from the true Linnean form of Southern India, and that the former corresponds to De Candolle's *subinæqualis*, we find under Roxburgh's *asiatica* and *tiliæfolia*, taken together, the following forms, not attempting for the moment to decide whether these are in each case "good species," *viz.*:—

(1) *G. asiatica* Linn. (typica!), cultivated only.
(2) *G. subinæqualis* DC., cultivated (and spontaneous?).
(3) *G. tiliæfolia* Vahl (vera!), spontaneous in South India.
(4) A species not yet satisfactorily identified, possibly the small tree of the Sewalik belt already mentioned.

We may next consider whether any other members of the *tiliæfolia* group were dealt with by Roxburgh. It seems far from likely that he should never have come across the tree which Wallich subsequently named *G. vestita*, and in fact the writer has no doubt at all that this was the species from Eastern Bengal which he was unfortunately led to refer to Vahl's *excelsa*. He had evidently seen only coppiced shoots, and hence described what is normally a tree as "shrubby." The type of *excelsa* Roxb. non Vahl (nec Masters) is to be found, in the writer's judgment, in a specimen collected by Buchanan in 1800 or earlier, and pro-served in the Smithian Herbarium, marked (by Buchanan, as it seems) as "*G. excelsa?*"

It will be noted that Roxburgh did not profess to have any direct knowledge of this species, and the description is a word for word translation from the *Symbolæ*, but he had in fact sent a specimen of *G. vestita* Wall. to Banks as No. 98 of the set of specimens transmitted (1791 to 1794) to Banks with the figures and descriptions of five hundred Indian plants mentioned by King in his *Brief Memoir*, of which someone, probably Dryander, selected three hundred, which were published in *Coromandel Plants*. It should be added that in no case can either the plant issued by Wallich as *vestita*, or that described at p. 104 of Royle's *Illustrations* as *elastica* be referred to *G. asiatica* Linn., or to *G. subinæqualis* DC., if the latter be the Calcutta Garden "*asiatica*." So far as the writer has been able to form an opinion, both *vestita* and *elastica* are simply climatic races of a type extending from the Indus Valley as far east perhaps as the Philippines, of which Jussieu's *celtidifolia* represents the chief Malayan form.

So far nothing has been said of the "*G. arborea*" of Roth, which he received from Heyne under the name of "*arborea* Roxburgh." Heyne's examples under the like title in Rottler's herbarium are all typical *tiliæfolia*, but Roth's description indicates *G. rotundifolia* Juss., and does not answer to *tiliæfolia* Vahl. It is noteworthy that *rotundifolia*, unless traceable under some other description, is not accounted for in the *Flora Indica*, and the probability is that Roxburgh and the missionaries, in the beginning at least, regarded *G. rotundifolia*, the true *tiliæfolia*, and certain other forms of which, for the present, we know very little, as "varieties" of a single polymorphic species, for which, as the first studied example was a good-sized tree, Roxburgh proposed the name "*arborea*," in contradistinction to the often scandent shrubs, such as *hirsuta*, with which he had been earlier familiar.

Let us now return to species No. 8 ("*salvifolia*"), and consider in connection with that species Nos. 9 ("*hirsuta*"), 11 ("*carpinifolia*"), 12 ("*pilosa*"), and 13 ("*polygama*"), which belong to one natural group, whereas "*salvifolia*" finds its affinities in the *Tiliæfoliæ*, and particularly with *rotundifolia* Juss., from which in some states it is hard to distinguish it.

We have seen already that the original *G. salvifolia* of the younger Linné, so far as the description goes, was not any *Grewia* at all. There is some reason to suppose that *Alangium hexapetalum* Willd. was sent to Europe mixed with *G. flavescens* Juss. (= *carpinifolia* Roxb. non Juss., also = *commutata* DC.), both being labelled by the senders "*G. montana*" (of the missionaries). British Museum specimens, gathered by Koenig or a colleague "ad latera et summitates montium," show that the type of "*G. montana*" was the plant which Vahl has described as *G. hirsuta*. The name "*montana*" was dropped, probably with regard to the younger Linné's "*salvifolia*," but in the meantime Roxburgh had sent to Smith as "*G. orientalis*" (which it was not) a gathering now in Smith's herbarium, which Smith, remarking that it was the *G. orientalis* of Vahl and Gaertner, referred to *G. pilosa* of Lamarck (Encycl. iii. 43, ann. 1789). There is a scrap of the same plant in the Linnean herbarium, not named by either Linné, which is also written up by Smith as "*G. pilosa,*" but erroneously, both specimens being really *G. carpinifolia* Roxb. non Juss.—i. e. *G. flavescens* Juss.—(syn. *G. commutata* DC. Prodr. i. 511). This error of Smith's has led to the subsequent very general misapplication of "*pilosa* Lamarck" to *G. flavescens*, both in Asia and Africa. This was not all, however, for on a specimen collected in Java, possibly by Thunberg, which an unknown annotator has correctly identified as *G. tomentosa* Juss., Smith made a note referring it to *hirsuta* Vahl, "ex characteris." All this helps in some measure to account for two puzzling circumstances, *viz.* (*a*) why Roxburgh, having in the first place named his Coromandel "*Jovellikee*" (No. 9 of the *Flora Indica*) "*tomentosa*" in MS., presently cancelled this in favour of "*hirsuta*" Vahl; (*b*) why Smith (in *Rees Cyclopædia*, xvii. s. v. *Grewia*), and later A. De Candolle (Prodr. i. 509), have given Java as the home of *G. hirsuta* Vahl (*cf.* Wight & Arnott, Prodr. 78, footnote). In point of fact the Javan *G. tomentosa*, which is found in Tonkin as well as in Java, but has not so far been collected further to the westward, is abundantly distinct from the true *hirsuta* Vahl, which conversely is a purely Indian type; for the forms referred to it from the Indo-Chinese region by Pierre (*Flore Forestière*, v. pl. 166 and 167, and text) are distinct from true *hirsuta*.

What happened apparently was more or less as follows. In the first instance Roxburgh supposed that he had traced what should now be called *G. Rothii* DC. to the description in the *Supplementum* by the younger Linné of a more or less imaginary *Grewia*, which as regards the material actually sent from India was at least in part an *Alangium*. *G. Rothii* was apparently not firmly discriminated by Koenig and his friends from the allied form first described by Gaertner from Ceylon material as *G. Damine* (De Fruct. ii. 112, t. 106, ann. 1788), so that in the end it was *G. Damine* that was sent as "*G. salvifolia*" to Roth by Heyne, and published as "*G. salvifolia*" by Roth (Nov. Plant. Spec. 239 (1821)).

We have seen, however, that the missionaries' "*G. montana*" probably included one or more examples of a true *Grewia*, viz. *G. commutata* of De Candolle, which is = *G. flavescens* Juss., a species ranging from Senegambia to the Coromandel coast of India in the drier regions of the subtropics. This species was one of the earliest collected in South India, and had been regarded as a variety of *G. orientalis* of the *Species Plantarum*; when it came under Smith's eye he ascribed it to the *G. pilosa* of the *Encyclopédie*.

(To be continued.)

BOTANICAL DIVISIONS OF THE BRITISH ISLANDS.

By C. E. Moss, D.Sc.

In arranging the general plan of the new *Cambridge British Flora*, one important matter has been to decide whether or not Watson's and Praeger's topographical divisions should be followed. After much consideration it has been decided not to use these divisions entirely, but to have divisions which are understood by the general public and easily ascertainable by foreign botanists. At the same time, it is essential to have the new divisions of such a nature that the mass of accumulated detail regarding the distribution of plants within the limits of the British Isles should be capable of being fully utilized. It is also desirable to arrange the new divisions into larger and, so far as the nature of the case permits, natural phytogeographical groups.

Accordingly, the divisions adopted follow, in nearly all cases, ordinary British counties. A few of the largest of these are subdivided into smaller units, and a few of the smallest are merged with neighbouring ones. The counties that are subdivided are Hampshire, Yorkshire, Aberdeenshire, Perthshire, Inverness-shire, Argyllshire, Ross and Cromarty, and Galway. The counties that are merged with neighbouring ones are Rutland (merged with Leicestershire), Clackmannanshire (merged with Stirlingshire—not with a part of Perthshire as was done by Watson), Kinross-shire (merged with Fifeshire), and Nairnshire (merged with Elginshire—not with a part of Inverness-shire as was done by Watson). The Channel Isles and the Isle of Man are, for the present purpose, treated as if they were British comital divisions, though it is well known that their government is of quite a different nature. Many reasons might be advanced for similarly treating the Danish Faröes; but, on the whole, it has been thought best to keep the main unit a political and not a natural one. In doing this one is simply following the plan of practically all floras.

The botanical and other important characteristics of the various divisions will be elucidated in volume i. of the new Flora; but, as several other volumes will be issued before this, it has been thought desirable to tabulate the new divisions at once. At present one need only state that the guiding principles in arranging the major divisions (A to T) and the minor divisions (1 to 127) have been, first, floristic relationships of species; secondly, climate (judged chiefly by the standard isothermal lines); thirdly, soil; and, fourthly, topographical position.

The numbers which appear in brackets after the name of the minor divisions are, in the case of Great Britain, the Watsonian vice-comital numbers, and, in the case of Ireland, the numbers used by Praeger. Of course, one has made the present Irish numbers follow consecutively on the British numbers, and has departed from Praeger's plan of beginning again at number one. It will thus be possible in the future to give a comital number for the whole of the British Isles: in the past, the numbers for Great

Britain and for Ireland have been given separately (*cf.* Druce's *List of British Plants*); or, as a rule, those of Ireland have been ignored by the botanists of Great Britain (cf. *The London Catalogue of British Plants*).

THE BRITISH ISLES.

I.—England.

A. South-western England.

1. The Channel Isles (0)
2. The Isle of Wight (10)
3. Hampshire (11, 12)
4. Dorset (9)
5. Devonshire (3, 4)
6. Cornwall (1, 2)
7. Somerset (5, 6)

B. South-eastern England.

8. Sussex (13, 14)
9. Kent (15, 16)
10. Surrey (17)
11. Middlesex (21)
12. Hertfordshire (20)
13. Cambridgeshire (29)
14. Essex (18, 19)
15. Suffolk (25, 26)
16. Norfolk (27, 28)

C. South-west-central England.

17. Wiltshire (7, 8)
18. Gloucestershire (33, 34)
19. Monmouthshire (35)
20. Herefordshire (36)
21. Worcestershire (37)

D. South-east-central England.

22. Berkshire (22)
23. Oxfordshire (23)
24. Buckinghamshire (24)
25. Bedfordshire (30)
26. Huntingdonshire (31)
27. Northamptonshire (32)
28. Warwickshire (38)

E. North-central England.

29. Shropshire (40)
30. Cheshire (58)
31. Staffordshire (39)
32. Derbyshire (57)
33. Leicestershire (55)
    Rutland
34. Nottinghamshire (56)
35. Lincolnshire (53, 54)

F. Northern England.

36. The East Riding of Yorkshire (61)
37. The West Riding of Yorkshire (63, 64)
38. The North Riding of Yorkshire (62, 65)
39. Lancashire (59, 60 *pro parte*)
40. The Isle of Man (71)
41. Westmorland (69 *pro parte*)
42. Cumberland (70)
43. Durham (66)
44. Northumberland (67, 68)

II.—Wales.

G. Southern Wales.

45. Glamorgan (41)
46. Carmarthenshire (44)
47. Pembrokeshire (45)
48. Cardiganshire (46)
49. Brecknockshire (42)
50. Radnorshire (43)

H. Northern Wales.

51. Montgomeryshire (47)
52. Merionethshire (48)
53. Carnarvonshire (49)
54. Anglesey (52)
55. Denbighshire (50)
56. Flintshire (51)

III.—Scotland.

I. South-western Scotland.

57. Wigtownshire (74)
58. Kirkcudbrightshire (73)
59. Dumfriesshire (72)
60. Ayrshire (75)
61. Buteshire (100)
62. Renfrewshire (76)
63. Dumbartonshire (99)

J. South-eastern Scotland.

64. Lanarkshire (77)
65. Peeblesshire (78)
66. Selkirkshire (79)
67. Roxburghshire (80)
68. Berwickshire (81)
69. Haddingtonshire (82)
70. Edinburghshire (83)
71. Linlithgowshire (84)

K. Eastern Scotland.

72. { Stirlingshire (86 *pro parte*)
    { Clackmannanshire
73. { Fifeshire (85)
    { Kinross-shire
74. Forfarshire (90)
75. Kincardineshire (91)

Aberdeenshire
76. (*a*) Southern Aberdeenshire (92)
77. (*b*) Northern Aberdeenshire (93)
78. Banffshire (94)
79. { Elginshire (95 *pro parte*)
    { Nairnshire

L. Central Scotland.

Perthshire
80. (*a*) Southern Perthshire (87 *pro parte*)
81. (*b*) Central Perthshire (88)
82. (*c*) Northern Perthshire (89)

Inverness-shire (see also below)
83. (*a*) Eastern Inverness-shire (96)

M. Western Scotland.

Argyllshire
84. (*a*) Eastern Argyllshire (98, 101)
85. (*b*) Western Argyllshire (102, 103)

Inverness-shire (see also above)
86. (*b*) Central Inverness-shire (97)
87. (*c*) Western Inverness-shire,—Skye, &c. (104)

N. Northern Scotland.

Ross and Cromarty
88. (*a*) Eastern Ross and Cromarty (105)
89. (*b*) Western Ross and Cromarty (106)
90. Sutherland (107, 108)
91. Caithness-shire (109)
92. The Outer Hebrides (110)
93. Orkney (111)
94. Zetland* (112)

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* This spelling is now adopted by the Ordnance Department instead of the more familiar "Shetland."

IV.—IRELAND.

O. SOUTH-WESTERN IRELAND.

95. Kerry (1, 2)
96. Cork (3, 4, 5)
97. Waterford (6)

P. WESTERN IRELAND.

98. Limerick (8)
99. Clare (9)
Galway
100. (*a*) Western Galway (16)
101. (*b*) Eastern Galway (15, 17)

Q. NORTH-WESTERN IRELAND.

102. Mayo (26, 27)
103. Sligo (28)
104. Leitrim (29)
105. Donegal (34, 35)

R. SOUTH-EASTERN IRELAND.

106. Tipperary (7, 10)
107. Kilkenny (11)
108. Wexford (12)
109. Carlow (13)
110. Wicklow (20)

S. EASTERN IRELAND.

111. Dublin (21)
112. Kildare (19)
113. Queen's County (14)
114. King's County (18)
115. Roscommon (25)
116. Westmeath (23)
117. Longford (24)
118. Meath (22)
119. Louth (31)
120. Cavan (30)

T. NORTH-EASTERN IRELAND.

121. Fermanagh (33)
122. Monaghan (32)
123. Tyrone (36)
124. Armagh (37)
125. Down (38)
126. Antrim (39)
127. Londonderry (40)

ON *VIOLA TRICOLOR* VAR. *SABULOSA* CAND. AND ALLIED FORMS.

BY FREDERIC N. WILLIAMS, F.L.S.

DURING a recent stay at Knocke, on the Belgian coast, I had the opportunity of studying this plant under various conditions of growth. Its appearance in the British List dates from the first annual report (1858) of the Botanical Exchange Club, p. 7, published at Thirsk (in 1859), under the auspices of Mr. J. G. Baker. It is there stated to have been found on the sandhills of New Brighton, in Cheshire. It is also stated that these examples of "*Viola sabulosa*" have more hairy stems and leaves than *V. Curtisii*. This, however, condemns the plant at the outset; as var. *sabulosa* is a glabrous plant, and the form that has its stems and leaves more hairy than the yellow-flowered *V. Curtisii* is the form we now know as *V. Curtisii* var. *Pesneaui*, or more correctly *V. tricolor* subsp. *Curtisii* var. *Pesneaui* (see also E. G. Baker, in *Journ. Bot.* 1901, p. 9). In his *Fl. Cheshire*, p. 39 (1899), Lord de Tabley says that the place where the plant was found is now built over, so that recent examples are not available for comparison.

In the annual report of the Botanical Exchange Club for 1864, p. 7, discussing *V. Curtisii* and *V. sabulosa*, Mr. J. G. Baker says:—"We do not see that there is any important character to rely upon to separate these perennial-rooted sandhill pansies from one another, and would consider them to form an intermediate link connecting the typical *tricolor* and typical *lutea*."

Syme, *English Botany*, ii. p. 26 (1864), includes the name of "*V. sabulosa* Boreau" among the synonyms of *V. tricolor* subsp. *Curtisii*, without mentioning any specific localities for the former. The object of the present note is to show that this is not a British plant; and that the examples that have been so named almost without exception come under *V. tricolor* var. *Pesneaui* Lloyd, which is a plant probably as widely distributed as var. *Curtisii* itself—in Britain; for Rouy & Foucaud, *Fl. de France*, iii. p. 51, state that they have not seen the latter from any localities on the French coast.

An index to var. *sabulosa* may be best furnished from its synonyms:—

V. tricolor var. *maritima* A. F. Schweigger, Bemerkung auf einer botanischen Reise von Königsberg über Pillau längst dem Strande nach Memel, in Königsberger Archiv, i. p. 210 (1812); et Hagen, Chloris Borussica, p. 88 (1819).

V. tricolor var. *vulgaris* Bosch, Enum. Plant. Zeel. Belg. p. 10 (1814).

V. littoralis Sprengel, Novi Proventus Hortorum academicorum Halensis et Berolinensis, p. 43 (1818).

V. tricolor var. *sabulosa* Cand., Prodr. i. p. 304 (1824); et Dumort., Fl. Belgica, p. 116 (1827).

V. tricolor var. *syrtica* H. G. Flörke, ex Mert. & Koch, Deutschlands Flora, ii. p. 272 (1826).

V. arvensis var. *syrtica* Bosch, Prodr. fl. Batav. p. 35 (1850).

V. tricolor var. *arenaria* Sonder, Fl. Hamburg. p. 137 (1851).

V. sabulosa Boreau, Notes et observations sur quelques Plantes de France, p. 53 (1853), extr. Bull. Soc. Industr. Angers, xxiv, n. 6, p. 335.

Some of the above references are given *in extenso*, as they are taken from little known floras or opuscula mentioned in some critical notes attached to Gay's specimens in Herb. Kew.—valuable and interesting observations by this scrupulous botanist and accurate worker, whose critical research into the structural differences of closely allied plants has hardly been appreciated by later workers in the herbarium. There is no doubt that the above names include two distinct forms of the same variety, which, hitherto, have not been properly distinguished:—two forms which I distinguish below as forma *concolor*, in which all the petals are blue-violet, and forma *discolor*, in which the large lower petal is yellow. Lange, however, *Haandb. Danske Fl.* ed. 2, p. 177 (1856), mentions *V. tricolor* var. *arenaria*, and *V. tricolor* var. *syrtica*. Though the Danish text is somewhat obscure, I believe that the first is identical with f. *discolor*, and the second with f. *concolor*.

De Candolle's original brief description of *V. tricolor* var. *sabulosa* is as follows:—Caulibus plurimis diffusis, foliis remotis ovatis elongatisve, sepalis angusto-lanceolatis corollâ vix brevioribus.—in arenosis maritimis Belgii et Galliæ." Here, De Candolle says nothing about the colour of the flowers, nor of the differential characters of the stipules and relative length of leaves and peduncles, as shown in the description of the two forms given further on. Nor does he refer to the sandhill Violet mentioned by German authors a few years previously. There is no reference to these German opuscula in the "Bibliotheca Botanica" which prefaces (and supplements) his *Systema Naturale* (1818–1821).

In *Journ. Bot.* 1909, suppl. p. 13, Dr. E. Drabble defines a group *Curtisieæ*:—"Perennial plants of maritime sandhills, with subterranean slender branching perennial stems. Flower with petals longer than the sepals, and with long petaline spur." This group I consider equal to and identical with Syme's *V. tricolor* subsp. *Curtisii*—but preferring Jordan's term of "grex" for "subspecies." In the interests both of convenience and of scientific accuracy, it will be best to conserve the three varietal names of *Curtisii*, *Pesneaui*, and *sabulosa* as constituting "Grex *maritima*" (= subsp. *Curtisii*). Schweigger's earliest name of *maritima* is thus kept up to include distinct forms and varieties of the sandhill plant which he defined only in the aggregate, and known to him only from the German coast.

Walking along the dunes from Knocke to the Dutch frontier, I found var. *sabulosa* fairly plentiful, and growing under two forms, which I describe below as f. *discolor* and f. *concolor*, the latter readily distinguished from var. *Pesneaui*, which, though it has similar blue-violet petals, is quite hairy and cæspitose as compared with var. *sabulosa*. Last year I observed it similarly along the dunes in walking from Ostend to the French frontier, especially near Nieuport.

In *Journ. Bot.* 1909, suppl. p. 14, Dr. E. Drabble aptly remarks:—"This plant differs from the other members of the *Curtisii* section in having long and very narrow leaves. Some of our British Pansies seem to be referable to this species, but I have not seen any with leaves so long and narrow as certain specimens from the West of France."

Going through the material in the British Herbarium of Herb. Mus. Brit., the nearest British specimens to var. *sabulosa* which I have seen are, one from Ross Links, Northumberland (*H. E. Fox*, 1884), and the other from Pembrey Burrows, Caermarthenshire (*E. S. Marshall*, 1899). In the first, the stem and leaves are distinctly hispid-hairy, the bracteoles are too high up on the peduncle, and the upper leaves are not narrow enough. In the second, the stem and leaves are also hispid-hairy, there are too many leaves on the lower part of the stem, and the leaves themselves are not long enough to match the Belgian plant.

Many notes were made from individual plants growing *in situ*; and in several instances the long root was dug out of the sand down to its lowest fibres. It is certainly perennial, like the British forms of the subspecies *Curtisii*; not biennial, as stated by French authors, or annual, as stated in Belgian plant-lists.

Dumortier, who seems to have overlooked the fact that Boreau had, fifteen years previously, raised the plant from varietal to specific rank, thus describes it in *Bull. Soc. Roy. Bot. Belg.* vii. p. 353 (1868):—"Caulibus diffusis, foliis remotis ovatis elongatisque, stipulis pinnatifidis laciniâ mediâ crenatâ, sepalis angusto-lanceolatis, capsulâ vix brevioribus." The note which follows I here translate:—"Made a variety by De Candolle in his *Prodromus*, it constitutes a true species, and we have indicated it as such to all our friends in our excursions along the dunes. It grows in Flanders, in Zeeland, in Holland, and in the north of France, without ever varying; we have cultivated it for a long time without its showing any modification." In *Index Kewensis* both Boreau's and Dumortier's references are quoted, as though there were a doubt about priority of date.

Wildeman & Durand, *Prodr. Fl. Belge*, iii. p. 355 (1900), give as the stations of var. *sabulosa* on the Belgian coast, Nieuport, Ostend, and Heyst. Within the limits of Ostend and Heyst, the plant, however, does not occur, as the ground is either built over or converted into 'digue-de-mer.' Beyond Heyst to the north-east, it is a feature of the sandhills from Duinbergen (which means "sandhills") through Knocke to the Dutch frontier; and beyond it, across the Zwyn creek to Breskens, opposite Flushing, further than which I did not proceed.

From the living plants the following description of var. *sabulosa* is drawn up, omitting the characters which are common both to *V. tricolor* (in the aggregate) and to subsp. *Curtisii*:—

Perennis, 8–20 ctim., glabra vel levissime parceque pilosula. Radix in sabulum longe recteque descendens. Caules diffusi, sat ramosi. Folia inferiora longe petiolata, ovalia; intermedia lanceolato-linearia; superiora elongata linearia crenulata, in petiolo parum decurrentia. Stipulæ utroque latere inæqualiter et irregulariter pinnatifidæ; lobi laterales lineares integri acuti patentes; lobus medianus lineari-oblongus, dentibus 1–2 rotundatis præditus. Bracteæ ovali-lanceolatæ, basi leviter denticulatæ, sat infra pedunculi curvaturam sitæ. Petala calycem tertiâ vix parte excedentia, obovalia; inferius latius cuneatum, calcare transverso cylindraceo.

Forma *discolor*.—Radix caulibus multum longior, usque ad 25 ctim. (cum caule 15 ctim.). Folia inferiora (lamina) 10 × 6½ mm., petiolo æquilongo. Stipulæ latere distali magis divisæ, lobis distalibus (quoad folium) 5–6, lobis proximalibus 2. Pedunculi 45–54 mm. Bracteæ 5 mm. infra curvaturam. Petala superiora et lateralia cœruleo-violacea, inferius luteum.

Stat. Along the ridges and exposed upper slopes of sandhills.

Forma *concolor*.—Radix caulibus subæquilonga, sæpe circiter 15 ctim. Folia inferiora (cum petiolo) 26–34 mm. Stipulæ latere proximali magis divisæ, lobis proximalibus (quoad folium) 4–5, lobis distalibus 2. Pedunculi 39–58 mm. Bracteæ 5 mm. infra curvaturam, 7·2 mm. infra calycis basin. Petala omnia cœruleo-violacea, sed inferius interdum basi lutescenti-ocellatum.

Stat. Usually in the hollows and along the lower (less exposed) slopes of sandhills.

Among the specimens of var. *sabulosa* in Herb. Kew. which I refer to f. *discolor* are :— (1) on dunes of the island of Walcheren, Holland, near the farm Oranjezon, adjoining the village of Oost-Kapelle, 1849 (*Gay, in company with Dr. Bosch*), (2) on the dunes of Dunkerque, France (*A. Boreau*, 1854; *S. V. Vercier*, 1855,—recorded as in flower April 18, and fruit formed August 26), (3) on the dunes of Etaples, arrondissement of Montreuil-sur-mer, department of Pas-de-Calais (*T. de Clermont*, 1853). To f. *concolor* I refer a specimen in Herb. Kew. (ex herb. Arthur Bennett) from the dunes of St. Quentin-en-Tourment, department of Somme (*E. Gonse*, 1877).

Of the three varieties of grex *maritima*, we have therefore :—(1) var. *sabulosa*, under two forms, extending from Memel, on the extreme north-east coast of Germany, westward to the north-west coast of Spain, but not found on the British coasts.

(2) var. *Pesneaui*, extending no further south than Delestages-de-Couëron, in the department of Loire-Inferieure, but found also on the British coasts; where it was first recognized in a plant from the islet of Mochras, near Harlech, Merioneth (*E. G. Baker*, in Journ. Bot. 1901, p. 9). This is the particularly hairy plant with all the petals blue-violet.

(3) var. *Curtisii*, the yellow-flowered plant, apparently confined to the British coasts, and not known on the Baltic and Atlantic seaboard of the Continent. This was first described in *Engl. Bot. Suppl.* t. 2693 (June 1831), from a plant found at Braunton Burrows, on the coast of Devon, where it was first gathered by W. Curtis, and cultivated in his garden under the name of "*Viola littoralis.*" Whether Curtis was aware of Sprengel's plant of the same name is very doubtful—the apt name for this sea-shore violet being probably no more than coincidental.

Probably some of the plants with "concolorous" petals found along the coasts of Germany and Denmark should be referred to var. *Pesneaui*, judging from Borbas's somewhat vague remarks under *V. tricolor* in the last German edition of Koch's *Synopsis*, p. 223 (1892). He says that in the maritime plant of the dunes, the petals are (all) violet, the upper somewhat darker, and that sometimes the plant is thickly covered with short, hispid hairs. This could hardly apply to var. *sabulosa* f. *concolor*, which is quite glabrous; but it would fit the description of var. *Pesneaui*, as clearly defined by Rouy & Foucaud, *Fl. de France*, iii. p. 50. The stipules in var. *Pesneaui* are quite different in appearance from what I have described in the two forms of var. *sabulosa*. And for this, among other reasons, I would suggest the exclusion of the latter from the British List.

A small *Viola* collected by Miss C. E. Palmer, in 1900, in a barren field outside Steyn Wood, Bembridge, Isle of Wight, was named by Borbas "*Viola banatica* Kit." It has, however, nothing in common with the Transsilvanian plant, which is a plant of mountainous districts. This addition to the British List will form the subject of a future note.

SUPPLEMENTAL NOTE ON *HAMELIA*.

By H. F. Wernham.

I am much indebted to the kindness of Dr. N. L. Britton, Director of the New York Botanical Garden, for drawing my attention to the following additional species of *Hamelia*, a genus with which I dealt in a recent paper (Journ. Bot. 1911, 206). Dr. Britton has been also good enough to present a portion of the type-plant to the National Herbarium.

H. Brittoniana, sp. nov. Foliis verticillatis pubescentibus, floribus majusculis manifeste pedicellatis corolla superne necnon ampliata.

Hab. Costa Rica; *Hb. Otto Kuntze*, 2178! ex Hb. New York Bot. Gard.

Frutex ramulis brevissime pubescentibus, foliis verticillatis lanceolatis 7–8 cm. × 2–2·5 cm. superne glabris subtus ferrugineo-pubescentibus utrinque angustatis acutis petiolis ad 1 cm. longis, stipulis subulatis ca. 4 mm. longis, cymis pubescentibus terminalibus floribus plerumque pedicellis ad 1·5 mm. longis, calycis totius 4–4·5 mm. longi tubo anguste cylindrico sparse pubescente nec sulcato limbi lobis latissime deltoideis, corollæ extus brevissime pubescentis tubo ca. 2 cm. longo sursum ampliato ad 6 mm. lato basi vix ventricoso lobis brevibus latiusculis acutis erectis, staminum linearium filamentis 4 mm. complanatis antheris 1·5 cm. longis apice spathulatis basi breviter appendiculatis.

The affinities of this species are with *H. patens*, but it is distinct in the size and shape of the corolla, in the relatively long floral pedicels, and in the shape of the calyx-tube.

H. Rovirosæ Wernham. I find that this Mexican species, described by me in the paper cited above, is identical with a plant collected by Turckheim in Guatemala, and described by Donnell Smith as a variety of *H. patens*—var. *coronata*—in Bot. Gaz. xl. 4. The type number is 8532 ex Pl. Guat. &c. quas ed. Donn. Sm. This plant unfortunately escaped my notice at the time when I was examining the genus, but I have no hesitation in maintaining its specific rank. Its relationships, in fact, do not appear to be with *H. patens* at all, as witness its glabrate leaves and long calyx-lobes. A co-type of Turckheim's plant, which Dr. Britton has been so good as to place at my disposal for examination has, moreover, a flower with a fully opened corolla. This is of a slender appearance, gradually and slightly widened above, and 2·2 cm. long. The pubescence on the inflorescence branches is characteristic in being conspicuously spreading, though short, and ferruginous. The calyx-lobes correspond precisely in shape with those of the type of *H. Rovirosæ*, but they are not revolute.

SHORT NOTES.

Mentha citrata Ehrh. in Herts.—In Journ. Bot. 1906, p. 32, is an interesting paper by Mr. James W. White on this Mint, found by him on Mendip. Mr. White dwells on the great rarity of this plant both in the wild state and in gardens. It may therefore be interesting to record that it still occurs in some plenty just outside Middlesex, at Northaw, Herts, as recorded by Pryor, presumably before 1880, in his *Flora of Hertfordshire*. In ordinary seasons, however, it often fails to flower in this locality owing to the lateness with which it comes to maturity. I have more than once visited the pond where it grows, late in September, and found only buds in a very immature condition, though some of the stems were four feet high. This year it probably flowered, or would have flowered, freely, but unfortunately by September 14, the date of my visit, the herbage round the pond had been cut down, and I could only find one flowering stem. In my garden it first flowered last year in a dry sunny situation, and this year it has flowered freely. All the flowers I have seen are of the form with short imperfect stamens, so it would probably fail to produce seed unless hybridized. The inflorescence is capitate, but sometimes a verticillaster, sometimes a pair of stalked heads, may occur below the terminal rounded head. The plant is practically glabrous, and the calyx is thickly studded with odoriferous glands. The bergamot fragrance is very marked. In Pryor's *Flora* (1887) one other Herts locality is given, between Roydon and Stanstead Abbots Church, but this is probably an error, for in the *Flora Hertfordiensis* (1849) this locality is given under *M. aquatica*, var. *glabrata*, no mention being made of var. *citrata*. A few years ago I looked for the latter in this locality, and could only find a glabrous form of *M. aquatica* having the usual rank odour of that species.—HENRY PEIRSON.

ABNORMAL DEVELOPMENT IN MAIZE.—A plant of Maize growing in my garden this summer, in addition to the usual terminal panicle of male flowers, and one or two female spikes on short lateral branches, has produced close to the ground a lateral stem nine inches long, ending in a small spike three and a half inches long with the grains arranged in twelve rows as usual. In addition to this, however, there are two small spikes, one very imperfect, springing from the base of the main spike, and one arising three quarters of an inch higher. The latter is two and a half inches long, the upper half inch being quite undeveloped. This spike, though defective in symmetry, appears to represent a two-sided spike, comparable to that of wheat or barley, the rachis having two longitudinal strips quite bare of grains, the inner one much the broader, and applied to the surface of the main spike. These bare portions seem to represent the edges of the flattened rachis in the cereals just mentioned. The grains are arranged alternately in pairs, a pair from each joint of the rachis, the whole arrangement corresponding to that of the spikelets of *Elymus*. As most readers are doubtless aware, a theory has recently been brought forward that Maize originated as a fasciated condition of *Euchlœna*, and it will be found that if three spikes such as the one I have described were completely and symmetrically fused together without loss of any of their florets, the result would be just what we find in a normal ear of Maize, with its twelve rows of grains in alternating pairs, an arrangement which has hitherto always puzzled me. I have no access to any description of *Euchlæna*, and it would be interesting to learn whether in that genus the arrangement of the grains upon the spike is such as I have indicated. In this Journal for 1909, p. 180, it is stated that *Zea* hybridizes with *Euchlæna*.—Henry Peirson.

Lincolnshire Notes.—In the ruined collection of the late Rev. Joseph Dodsworth, Vicar of Bourne, which reached me in 1893, was a Lincolnshire specimen of *Suæda fruticosa* Forsk., dated 1836. The locality was not given, and its home has been fruitlessly searched for ever since. Mr. H. A. H. Healey, of Dawesmere, Holbeach (53 S. Lincs.), sent me a beautiful specimen in July with the following note: "In fair quantity seaward side of the seabank here." Mr. B. Reynolds, writing from Skegness in July last, reported a variety of *Papaver Rhœas* L. with the yellow sap of *P. Lecoqii* Lam. Later he wrote: "The fruit is globular, the hairs on the peduncle spreading; everything is characteristic but the juice." Personally I have never met with this form. My experience as a worker leads me to believe that *Rumex maritimus* L. and *R. limosus* Thuill. are but one species, with two forms according to the season. After a series of wet summers *R. maritimus* may be found round every sandy inland pond, and not a few clay-pits too. After a few dry seasons it cannot practically be found anywhere inland, with one exception—the permanent peat-ponds or "flashes" on thin sand overlying clay. The curious thing to note is that after a series of wet summers the very same pond supplies the tall *limosus* form, with its characteristic fruits; after a series of dry seasons, the *maritimus* form, four to six inches high, with its typical fruit. Why this change, I ask, on the limited area of an acre, if these so-called species are not climatic forms?—E. A. Woodruffe-Peacock.

Erigeron acre × canadense = E. Hulsenii Kerner, vol. ii. p. 585.—On the Somerset side of Bristol, at Ashton Gate, *Erigeron acre* and *E. canadense* both grow in some quantity on the site of abandoned ironworks, and amongst them I have lately detected a hybrid intermediate in characters and sterile. This plant, of which a good number were seen, is from four to ten inches in height, of graceful habit, with pale lilac or bluish purple flowers, quite different from the dull red-purple tint of *E. acre*. The hybrid must be extremely rare, as only one mention of its previous occurrence in this country seems to be on record—a single specimen near Tilford, Surrey, by the Rev. E. S. Marshall, in 1884 (Journ. Bot. 1907, p. 164). Mr. J. W. White sent examples to the Rev. E. S. Marshall, who writes that his Surrey plant was large and spreading, with considerably larger heads than those of mine, and was not so good an intermediate, but that all are practically identical in leaves and phyllaries. The fruits are found to be of medium size, but empty. There is no record for this hybrid in the French Floras, but it is given by Focke from several places in East Germany.—Ida M. Roper.

LEPTODONTIUM RECURVIFOLIUM (Tayl.) Lindb. IN ENGLAND.—During a fortnight's stay in the Lake District in August and September I was fortunate in finding a few stems of this moss by a small cascade below Ruthwaite Cove, Helvellyn, v.-c. 69. Careful search in the neighbourhood during the next two days entirely failed to discover any extension of its range. It is especially interesting to have this plant recorded from England, as it is one of our few genuinely endemic mosses, and has been found up to now only in Scotland, Wales, and S.W. Ireland, its distribution being of an entirely western or Atlantic type. I also gathered *Grimmia retracta* Stirl. on the Cumberland side of Ullswater, a record for v.-c. 70; *Webera proligera* Bryhn on Striding Edge, a record for v.-c. 69; *Thuidium delicatulum* Mitt. in Grisedale, Helvellyn; and *Dicranum Starkei* Web. & Mohr on Kidsty Pike, Westmorland, which although recorded from v.-c. 69 must I think, be extremely rare in this district.—H. N. DIXON.

APLOZIA RIVULARIS Schiffner.—In *Lotos* (Band 59, Heft 1–3 (1911)) Prof. Schiffner raises to the rank of a species his *Aplozia pumila* var. *rivularis*, a plant found in several places on the Continent. Early this month I found this on wet dripping shaley rocks at Woodhead, Derbyshire. I have submitted specimens to Prof. Schiffner who writes: "I have carefully examined your specimens and have found antheridia, so it is without doubt my *Aplozia rivularis*. The discovery of this rare plant in England is very interesting. I shall be glad if you can supply me with a set of this plant for my 'Hep. eur. exs.' The English specimens are very characteristic." *A. rivularis* agrees in habit with *A. riparia*, but is distinguished from it by its paroicous inflorescence. From *A. pumila* it differs by its different habit, much larger size, larger leaf-cells, the very large, different shaped perianth and other characters, as pointed out by Prof. Schiffner.—W. H. PEARSON.

REVIEWS.

Die Lebermoose Deutschlands, Œsterreichs und der Schweiz mit Berücksichtigung der übrigen Länder Europas. By Dr. KARL MÜLLER. Leipzig: Kummer. 1906–11. Abteilung i. pp. vii, 871. 363 text figs. by P. JANZEN. Price m. 33·60.

THIS volume forms part of Rabenhorst's Kryptogamen-Flora, the second edition of which in bulk and importance is an immense advance upon its modest forerunner, and consists of a series of thick and imposing volumes by such competent authorities as Luerssen (Ferns), Limpricht (Mosses), Migula (*Characeæ*), Hauck (*Algæ*), Winter, Rehm, Fischer, Allescher, and Lindau (Fungi). The only group of cryptogams which does not appear to have been arranged for is the Lichens, despite the imperative need for a comprehensive monograph of the Lichens of Central Europe. Badly needed also was a modern and trustworthy monograph of the *Hepaticæ* till Dr. Karl Müller, of Freiburg, took the present treatise in hand. The standard of these monographs is high; the work is deep, sound, and original; the illustrations in the text are numerous and helpful. Also the information conveyed by the text inspires the feeling that it has been prepared by experts who are thoroughly acquainted with their subject and with the plants of which they treat. Naturally the several monographs differ in the degree of perfection to which they are carried. The more recent are the more elaborate. And it will be found that Dr. K. Müller's contribution is one of the best, partly because it is the most modern, and partly because the author has the power and takes the trouble to make his meaning clear and to lessen the difficulties of the subject.

The present volume represents half of the monograph and consists of two parts. The first is introductory and occupies 137 pages. It treats in general terms of the *Hepaticæ*, their morphology, anatomy, physiology, and reproduction. The second part is descriptive and comprises the systematic treatment of the *Ricciaceæ*, *Marchantiaceæ*, the anacrogynous section of the *Jungermanniaceæ*, and one tribe of the acrogynous section, namely the *Epigonantheæ*. It is in this descriptive part that conspicuous evidence is furnished of the author's ability for digesting masses of difficult facts and presenting them in as simple an order as nature will allow. By the employment of diagrams, keys, pedigree tables, tables of salient characters, and other expedients, he endeavours to render the subject less formidable to the student. And he has spared himself no pains to ensure accuracy and completeness. Hence his work is as satisfactory as it is elaborate.

A. G.

Biologische und Morphologische Untersuchungen über Wasser-und Sumpfgewächse. Von Prof. Dr. H. Glück. Bd. ii. pp. xviii. 256, 28 text-figures, 6 lithographic plates. Price 18 m. Bd. iii. pp. xxxiv. 644, 105 text-figures, 8 lithographic plates. Price 33 m. Jena: G. Fischer.

The first volume of Dr. Glück's work on the biology and morphology of Water and Marsh plants appeared in 1905, and formed a monographic life-history of the European *Alismaceæ*. It was followed in 1906 by a second volume which dealt mainly with the Central European species of *Utricularia*. The author took up afresh the much-discussed problem of the morphology of *Utricularia*. Numerous departures from the normal structure in the german species showed that leaves can be converted into shoots and shoots into leaf-structures; hence it follows that shoot, leaf, and bladder are morphologically identical. The author considers that the most natural interpretation is to regard the vegetative body as a structure consisting of axis and leaves. Then follows a biological account of the various locality forms; several species show three distinct forms, deep-water, shallow-water, and land forms; the shallow form represents the optimum development. Two chapters are devoted to the discussion of winter buds of water plants in general; these become separated from the axis and serve as resting buds and for vegetative propagation.

The recently issued third volume is entitled "Die Uferflora."

Under this term the author includes those species which occur in the inundation-area of freshwater associations and which vary according to the amount of water present. One hundred and fourteen species have been investigated, as well as numerous locality-forms, and the area over which the author has worked includes the West European and Mediterranean floras as well as the Central European. A subdivision into zones and groups is made on morphological and biological grounds depending on the appearance of aerial leaves, floating leaves and submerged leaves, as well as on the existence of one or two leaf-forms (homoblastic or heteroblastic).

Zone i. includes thirty-six species which are essentially homoblastic and comprise submerged forms with reduced organs (unbranched or slightly branched stems and small leaves). They are distributed among seven groups according to the development of the leaf. Here belong *Lysimachia vulgaris*, *Hydrocotyle vulgaris*, *Cicuta virosa*, &c.

Zone ii. includes eighty-eight species, which comprise submerged or floating forms, but always show a strongly developed leaf-surface. There are eight groups which are characterised as homoblastic or heteroblastic, and by the presence of aerial, floating, or submerged leaves and a greater or less development of the leaf-surface. Some general considerations follow, in which the following points are referred to among others—optimum growth of water forms, dwarf forms, presence of ærenchyma, duration of life of locality forms, resting periods, and presence of cleistogamous and submerged flowers.

The volume concludes with an index of the plants referred to in the text, and a list of the books and papers cited.

Dr. Glück's valuable and suggestive contributions to our knowledge of the biology and morphology of aquatic plants will conclude with a fourth volume, which is in preparation, and is entitled "Submerse und Schwimmblatt-flora."

A. B. R.

The Bulb Book, or Bulbous and Tuberous Plants for the Open Air, Stove and Greenhouse: containing particulars as to Descriptions, Culture, Propagation, &c., of Plants from all parts of the World, having Bulbs, Corms, Tubers, or Rhizomes (Orchids excluded). By John Weathers. Illustrated by the Author. Demy 8vo, cl. pp. xv. 471, 342 figures. Price 15*s*. net. Murray.

It is necessary to cite in full the title of this latest addition to the not inconsiderable number of volumes which stand under Mr. Weathers's name, as the abridgement—"The Bulb Book"—which appears on the back of the volume would give no adequate notion of its contents. Not only are tuberous and rhizomatous plants included, but, "as almost any plant with a swollen rootstock or thickish creeping roots is called 'bulbous' in popular parlance, plants with such peculiarities have been considered in the present work." With this explanation, the surprise with which one finds in it such plants as *Gypsophila paniculata* is removed.

The volume which is thus comprehensive is arranged alphabetically under genera; among the introductory chapters is a useful synopsis of the orders represented, under each being a list of the genera included in the book. These introductory chapters are very well done, dealing with the definitions of bulbs, corms, tubers, and rhizomes and their functions, with cultivation in the open air and under glass, propagation, stoving, forcing, and the like, with suggestions for planting, and directions for growing for special purposes; there is also an interesting chapter on "freaks," with illustrations — the illustrations throughout form an attractive feature of the book, the bulk of which of course consists of descriptions of the genera and species included. To each genus is prefixed what are evidently full and accurate cultural directions; to most of the species is added a reference to a coloured plate or other good figure in standard botanical and horticultural works, and the names of the genera are explained. An appendix contains a list of the principal publications quoted and consulted, and a short glossary of technical terms; there is also an excellent index. It will thus be seen that the volume, which is attractively produced and beautifully printed in double columns, has been prepared with great care and adequate knowledge, and forms a useful addition to our botanico-horticultural literature.

BOOKNOTES, NEWS, &c.

In our notice of the Report of the Botanical Exchange Club (p. 326) we omitted to mention the brief but interesting account of the Botanical Society of London and of the early history of the Club which accompanies but is detached from the Report. The Club was of course a direct outcome if not an actual continuation of the Society (which was dissolved in 1857), Mr. J. G. Baker having undertaken to carry on the distribution of specimens at Thirsk in connection with the local Natural History Society. On the dissolution of this body in 1866, the distribution was transferred to London, whither Mr. Baker had moved. It would be of interest if some fuller account could be published of a Club which has for more than half a century been supported by the leading British botanists; no one could do this better than Mr. Druce, to whose energy it has during later years been so greatly indebted, and it would be well if it could be done while Mr. Baker, its first curator, is still with us.

The number (275) of the *Journal of the Linnean Society* (Botany) published on Sept. 21 is devoted to an account of the collections made in Gaza-land by Mr. C. F. M. Swynnerton, of which some account was given in this Journal for 1910, p. 190. The plants, which were presented to the National Herbarium by Mr. Swynnerton, were worked out by the officers, with some assistance from members of the Kew staff and other botanists. A large number of new species are described and the paper is illustrated by five plates and a map. We note that the description of *Swynnertonia*, described by Mr. Moore and figured in this Journal for 1908 (t. 495), is here slightly modified.

SOME NEW FORMS OF HIERACIA.

By Rev. E. F. Linton, M.A.

In his contribution towards a paper on the British Hieracia and their distribution which the Rev. A. Ley was preparing for me to complete, he drew my attention to two or three forms which he asked me to examine, and, if I thought them distinct, to describe. The Rev. W. R. Linton also left several forms set apart for consideration, which could not be identified. Some few of these are now given a description in the following paper, under the MS. name of one or other of these lamented associates in the study of hawkweeds, if such a name has been found in their MS. notes.

H. Leyi F. J. Hanbury var. vestitum Ley in Herb., nov. var. The peduncles of this variety are clothed with scattered long hairs, densely glandular just below the heads; phyllaries very dark, senescent, otherwise almost efloccose, clothed with much long hair and strong unequal glands. Ligule tip more or less ciliate but often glabrescent; style noted as yellow by the Rev. W. R. Linton, who collected it with Mr. Ley, and made many descriptive notes.

Dollywaggon Pike; High Street Cliffs at Riggindale Head, Westmorland. Another form of *H. Leyi* also grows on Dollywaggon, with heads rather thinly clothed compared with the type.

H. sordidum W. R. Linton MS. in herb. Stem 6–12 in., thinly and shortly pilose, floccose upward; leaves rather thick, dull glaucous-green, blotched in exposure with purple-brown, glabrous above sparingly pilose beneath, long ciliate; outer roundish-oval to oblong obtuse, base truncate or cordate-sagittate, inner subtriangular ovate to ovate-oblong and oblong-lanceolate (innermost acute), somewhat dentate, often with large retrorse teeth varying the subtruncate base; stem-leaf 0 or at most a sessile leafy bract. Panicle 1–3-flowered, rarely with a lower two-flowered ascending branch; heads moderately large, ovoid, greyish; peduncles floccose with many hairs and unequal glands; phyllaries similarly clothed, margins markedly floccose, hairs more numerous than glands ("equally numerous," W. R. L.). Ligule tip glabrous; styles livescent; pappus brownish-grey, exceeding the phyllaries.

H. sordidum W. R. Linton MS., sp. nov. Caulis brevis 0-folius pilis sparsis obsitus superne mediocriter floccosus. Folia rosularia viridi-glaucescentia breviter petiolata, longe ciliata, supra glabra maculis brunneo-purpureis (nisi in locis umbrosis) conspurcata, subtus parce pilosa; exteriora rotundo-ovalia vel -oblonga ad basin truncata vel cordato-sagittata, interiora subtriangulari-ovata, ovato-oblonga vel oblongo-lanceolata ± acuta, sat dentata, basi sæpe fortiter reverso-dentata. Anthela subsimplex 1–3-cephala raro ramo 2-cephalo inferiori, pedicellis brevibus floccosis pilis et glandulis multis inæqualibus obtectis. Involucra striato-canescentia sat magna ovata. Squamæ plures angustæ interiores acutæ subulatæ, omnes pilis sat densis et glandulis haud multo paucioribus obtectæ, externe leviter et in marginibus dense stellatæ. Calathium læte luteum. Ligulæ ad apicem glabræ. Styli obscuri.

Dr. Dahlstedt remarked on specimens sent him, "*H. sordidum* does not belong to any of our forms, and not to *H. Schmidtii* group, which has yellow styles; this one has dark styles."

First gathered by us in 1890 at Craigmichen Scar, near Moffat, Dumfriesshire, and grown at Bournemouth and Shirley; then in large quantity in 1907 by the Revs. W. R. Linton and E. S. Marshall (see Watson B. E. C. Report, 1910, pp. 148, 149) from the same locality.

Allied to *H. Schmidtii* by its foliage and to *H. lasiophyllum* by the look and clothing of the involucre, it differs from the former in its inflorescence generally and its spot-leaved foliage, from the latter by its broader subglabrate leaves, and from both by its compact habit and livid style. The latter feature suggested the name.

H. dentifex, sp. nov. Stem about 18 in., subglabrous, thinly hairy below; leaves green, hairy beneath, dentate (sharply in cultivation), long-petioled, earlier broadly ovate with broad subcordate or truncate base, later ovate-oblong to oblong-lanceolate; stem-leaf 0 or at most a laciniate bract. Panicle few-flowered; peduncles floccose, glands numerous, strong, very unequal; phyllaries lightly floccose chiefly on the margins, strongly glandular, with few hairs, scarcely senescent (the primary head nearly as hairy as it is glandular); ligule tip glabrous; style yellow.

H. DENTIFEX, sp. nov. Caulis sparsim vel raro pilosus, superne floccosus. Folia rosularia viridia, longe petiolata, supra glabrescentia, subtus pilosa, exteriora late ovata basi subcordata-truncata, interiora ovato-oblonga—oblongo-lanceolata, inæqualiter et grosse dentata acuta; folium caulinum 0 vel parvum laciniatum. Anthela oligocephala, pedicellis floccosis, glandulis densis fortibus et inæqualibus instructis. Involucra basi rotundi-ovata. Squamæ angustæ dorso levius marginibus densius floccosæ, sparsim pilis densius glandulis sat validis obsitæ, vix comatæ. Ligulæ ad apicem glabræ. Stylus luteus.

This was sent by W. R. Linton to Dr. Dahlstedt as *H. Schmidtii* form ?, and he replied that it was "not *H. Schmidtii*, but an allied form." It differs from the aggregate *H. Schmidtii* in having green not glaucous leaves, shorter and less acuminate, longer petioles, more glandular and less pilose peduncles, floccose and much more glandular heads with stronger and more unequal glands. It is best placed next after *H. Schmidtii*.

Gravelly or rubble banks in the Clova valley below the hotel, Forfarshire.

H. SOMMERFELTII Lindeb. var. SETOSUM ex herb. W. R. Linton, nov. var. Stem pilose below; leaves green, hairy on both surfaces and ciliate, unspotted, dentate; stem-leaves 1–2, well-developed, lanceolate dentate. Heads few; peduncles floccose, pilose and glandular, glands subequal; style yellow.

This variety is more hairy throughout than the type and more glandular in the inflorescence. The leaves are much more dentate, and the stem-leaves conspicuous instead of being more commonly absent in the type. It is referred to in a note on p. 28, Brit. Hier.

In some quantity over some length of cliffs near Berriedale, Caithness.

A plant from Craig Breidden was left for description by Mr. Ley and named by him *H. stenolepis* var. *subciliatum*, with glaucous leaves which were strongly ciliate, outer broadly oval subentire, inner oblong-lanceolate with few teeth, glandular peduncles, heads rounded below, phyllaries very slightly floccose but more glandular than the type, style "dark" (A. L.), "livescent" (W. R. L.), ligule tip "setose" (A. L.); but the material collected by both botanists together is so scanty that I should hesitate to place it in the list without seeing more specimens.

H. orithales, sp. nov. Stem 1–1½ ft., thinly pilose below. Leaves yellowish-green, hairy chiefly on the nerves below; earlier roundly oval, denticulate, truncate at the base, scarcely ever subcordate, hairy above; intermediate and latest ovate-oblong to oblong-lanceolate, dentate and narrowing below to the medium petiole, subglabrous above; stem-leaf 0 or 1, oblong-lanceolate to linear, dentate or entire. Panicle falsely furcate, lower branches on strong plants overtopping the primary flower; heads 4–12, rather under middle size, blackish green; peduncles somewhat floccose, with some hairs and usually numerous short subequal glands, ascending or suberect; phyllaries linear-subulate, narrow, obtuse (inner subacute), lightly but deciduously floccose with much black-based hair and fewer glands (few on primordial, more and sometimes many on later heads). Ligule tip pilose (or at least subciliate). Style livid (or yellowish, then livescent).

H. ORITHALES, sp. nov. Caulis 30–50 cm. altus 0–1-folius sparsim pilosus. Folia rosularia lutescenti-viridia, subtus sparsim et in nervis dorsalibus densius pilosa, petiolis molliter hirtis, exteriora rotunde ovalia denticulata basi truncata supra ± pilosa, interiora ovato-oblonga et oblongo-lanceolata ad basin angustata et dentibus sæpe magnis et patentibus prædita, supra subglabra; fol. caulinum sæpe evolutum oblongo-lanceolatum v. lineare dentatum v. integrum. Anthela sublaxa sæpe simplex sæpe sat composita ramis suberectis—arcuatis, pedicellis floccosis pilis sparsis glandulisque nigris brevibus obscuratis. Involucra brevia ovata; squamæ sat angustæ sublineares obtusæ leviter at decidue floccosæ parce comatæ pilis sat densis glandulisque obscuris obsitæ. Ligulæ pilosæ vel subciliatæ. Stylus lividus vel livescens.

This description is based in the first instance on specimens gathered in Corrie Dubh Galair, Glen Lochay, Mid-Perth, by the Rev. W. R. Linton (no. 100) and myself (no. 158), and on notes made by him towards a description. He suggested no name, though he learnt Dr. Dahlstedt's opinion ("seems to be very closely related to *H. expallidum* Norrl. and *H. philanthrax* Stenstr. from Sweden"). It may therefore be placed in our list somewhere between these two. I am able now to add some further localities by uniting with this some other gatherings of mine from Scotland, a gathering of Revs. W. R. Linton and E. S. Marshall from Kinnel Burn, near Moffat, and with rather less assurance one of Rev. A. Ley's Yorkshire gatherings of *H. philanthrax*, which seems to be not that plant but my new species. The distribution then is:—64 Buckden, Mid-west Yorks, A. Ley. 72 Dumfries, W. R. Linton. 88 Meall na Saone, Mid-Perth, E. F. and W. R. Linton. 90 By the Blackwater River, Loch Brandy and Glen Doll, Clova, Forfar. A Glen Shee plant, 89, perhaps belongs here, having the foliage though not the more glandular inflorescence of *H. orithales*.

H. HOLOPHYLLUM W. R. Linton var. DENTULUM, nov. var. Leaves dull green, purpurascent, more rounded or even truncate at the base than the type, inner ovate-oblong, somewhat dentate in the lower half (strongly dentate in cultivation); stem-leaf ovate-acuminate more or less dentate. Peduncles floccose, with several glands and hairs; phyllaries darker green than the type with more numerous glands and hairs. Style livid.

Hestleden Glen; Cowside Beck, Arncliffe; Kettlewell; Dent Dale, W. Yorks.

This variety is more distinct than appears from comparing the description here given with that of the type in Brit. Hier. p. 50. The latter was expanded so as to include the Arncliffe and Kettlewell forms. The leaves of the type have no well-developed teeth, the heads are green not blackish-green, the styles are pure yellow by the original description, and yellowish though not always a clear yellow, "becoming dusky with age" (Journ. Bot. 1890, 376).

The material for this variety was collected by the Revs. A. Ley and W. R. Linton, and points of difference were noted, but no MS. name occurs in their notes.

H. RIGIDUM Hartm. var. RUBEFACTUM, nov. var. ex herb. W. R. Linton. Stem somewhat scabrid, pilose, rubescent. Leaves firm, rather sparse, lanceolate, narrowed to the petiole in the lower or to a sessile base in the upper, only the uppermost rather broad-based; dentate with few teeth, ultimately rubescent; phyllaries efloccose, with fairly numerous unequal glands, hairs few or 0. Style livid.

This variety comes nearest to var. *Friesii* of our forms, and has "not been seen among the Scandinavian *Rigida*" (*teste* Dahlstedt).

This variety has been found in the following localities:—Derbyshire: Chapel-en-le-Frith; along Bar Brook, above Baslow; a plant from near Bamford, with more yellow-livid styles, seems to be the same variety. Radnorshire: railway banks near Rhayader.

THE GREWIAS OF ROXBURGH.

By J. R. Drummond, B.A., F.L.S.

(Concluded from p. 337.)

From Rottler's herbarium, now incorporated at Kew, it is fairly evident that the early workers in India had not succeeded in distinguishing the true *hirsuta* of Vahl from *G. flavescens* Juss., that in fact they looked upon the whole series covered by Nos. 9, 11, 12, and possibly 13 of the *Flora Indica* as varieties of a single species, for which, on learning from the followers of Linnæus that it could not be placed under his *G. orientalis*, they proposed the name of *G. montana*. For a time Roxburgh continued to name specimens of "*G. montana*" which were true *hirsuta* Vahl as "*G. salvifolia*"; later, as in his unpublished figure No. 226, he proposed to call this species "*tomentosa*," either with respect to Jussieu's description of the Javan plant, or, more probably, not knowing that the title was preoccupied, independently with reference to an obvious character. Ultimately he restricted "*salvifolia*" to *G. Rothii* (*cf.* tab. ined. 225), and substituted Vahl's *hirsuta* for his own "*tomentosa*" on the authority, most likely, of a letter to Rottler from Vahl of May 20th, 1797, in which Vahl announced that the plant sent as "*tomentosa*" differed from the type of *G. hirsuta* (Symbol. i. 34) forwarded by Koenig only in being less hairy; meantime he had seen that the plant, which is in fact the *G. flavescens* of Jussieu, differed essentially from "*G. montana*," and he had it well figured in tab. 224 as "*G. bipartita*," a name never published, founded on a character which, as he duly noted, marked it off in any case from *G. hirsuta*. Finally he was induced to refer this species to the *G. carpinifolia* of Juss., a close ally it is true, but quite distinct, occupying a different climatic zone, and confined to parts of Western and Central Africa. It is to this species probably that the name "*pilosa*" and in part the characters of No. 12 were originally meant to be applied by Roxburgh. The name "*pilosa*" he got doubtless from Smith, and when (for *G. flavescens*) he amended that to "*carpinifolia*" Juss., he evidently considered that he was at liberty to take it up again for a new form which he had received from "the interior parts of Bengal."

Wight & Arnott's explanation of the disconcerting assertion made under "*G. pilosa* R." that *pilosa* R. has two-celled, "*G. hirsuta* Vahl" but one-celled, "nuts" is at least plausible, but in suggesting that "*G. pilosa* R." was only known to the author of the *Flora Indica* from garden examples, they have surely relied too much on negative evidence. Roxburgh was doubtless well acquainted with *flavescens* Jussieu in the Circar Mountains, while the plant which he got from the interior of Bengal was surely the North Indian *Grewia*, to which we may for the present refer as *G. helicterifolia* Wall. This has not unfrequently been collected, among others, by Sir J. D. Hooker, in the hilly country between Raniganj and Mongir on the right bank of the Ganges. William

Roxburgh collected in the Rajmahal Hills, which are in this country, and there is no reason to suppose that his contributions to the Calcutta Garden consisted of seeds only. *G. helicterifolia* Wall. practically replaces *G. hirsuta* Vahl to the north of the Vindhya chain of mountains, and extends over the Indo-Gangetic tract as far as the Panjab Salt Range (Indus basin). Wight and Arnott had no doubt observed that the only authentic types of "*G. pilosa*" at Kew (there are none apparently in any other collection) had been grown at Sibpur; but it does not follow that this was the only material to which Roxburgh had access. It would be premature at this stage to discuss the validity of species in this difficult group; but assuming that "*helicterifolia*" Wallich, as understood by Royle, which is easily recognizable in the field and the herbarium alike, is valid, then there can be little question that Roxburgh's No. 12, as regards the locality and parts of the description, corresponds to *G. helicterifolia*.

No. 13, *G. polygama*, remains; and it must be admitted that in this case too much weight was placed on the polygamous inflorescence. All the species of the *G. hirsuta* group, which has meantime been enriched from the Indo-Chinese region, tend probably to be polygamo-diœcious. On the other hand, the characters which mark off *G. polygama* from its allies, though not very easy to describe, are manifest and constant; they will be indicated in a key to certain of the Indian species with which these notes will be concluded. The type of *polygama* is in Smith's herbarium (a male shoot only) and there are duplicates at Kew.

To sum up as regards this group, the Roxburghian species emerge thus:—

No. 9. HIRSUTA Vahl, Teling. Juvellikee.
Hab. Southern and Central India.
= *G. hirsuta* Vahl.

11. CARPINIFOLIA Juss. Teling. Nullee.
= *G. flavescens* Juss.
Hab. Arid subtropical belt of Asia, Africa, South and Central India to Senegambia.

12. PILOSA R. (pro parte).
Hab. Northern India from the eastern spurs of the Vindhya chain to the Sewaliks northwards, and west to the Indus basin.
= *G. helicterifolia* Wall.

13. POLYGAMA R.
= *G. polygama* Roxb.
Hab. Eastern Bengal; South India (?).

The following recapitulation will assist the reader in forming conclusions on the intricate questions handled above.

The numbers cited from the *Flora Indica* are those actually printed in Carey's edition (1832), and the specific name is that assigned by Roxburgh in the same work, but the arrangement of the species follows that adopted in Prain's *Bengal Plants*, i. 281–4.

(1) No. 11, Fl. Ind. ii. 587, "*carpinifolia* Juss." is properly

= *G. flavescens* Juss. in Ann. Mus. iv. 91 (= *G. commutata* DC. Prodr. i. 511). This is also = *G. carpinifolia* Mast. in Hook. fil. Fl. Br. Ind. i. 387, non Juss., and in part = *G. pilosa* Mast. in Hook. fil. Fl. Br. Ind. i. 388, non Lamarck. Lamarck's plant was simply *G. orientalis* L. Sp. Pl. ii. 964 (excluding synonyms from Rheede, Hort. Malab.), which is not *G. orientalis* Roxb. Fl. Ind. ii. 586, nor of Masters in Hook. fil. Fl. Br. Ind. i. 384, but is *G. columnaris* Smith in Rees Cycl. xvii. *G. carpinifolia* Juss. is a purely African type, characteristic of the Guinea coast, extending to other parts of West Africa, but unknown, so far as present information goes, in East Africa and Asia. *G. flavescens* Juss. is a widely distributed species in the dry hot zone of the Old World from Senegambia to Coromandel.

(2) No. 2, Fl. Ind. ii. 584, "*scabrophylla* R." The proper citation is *G. sclerophylla* Roxb. ex G. Don, Gen. Syst. i. 550 = *G. sclerophylla* Roxb. of Prain's *Bengal Plants*, i. 283 = Roxb. tab. ined. No. 1859.

(3) No. 10, Fl. Ind. ii. 587, "*tiliæfolia* Vahl, Symb. i. 35," is in part only = the true *tiliæfolia* of Vahl, which is a large tree abundant in S. India, but not found so far elsewhere; with this Roxburgh included certain other races, of which one may be the spontaneous form of *G. subinæqualis* DC. Prodr. i. 511. *G. tiliæfolia* Masters in Hook. fil. Fl. Br. Ind. i. 386 also includes forms which are not referable to Vahl's species.

The *Behar* habitat in *Bengal Plants*, i. 283, almost certainly belongs to a distinct though allied species.

(4) No. 5, Fl. Ind. ii. 586, "*G. excelsa* Vahl, Symb. i. 35." This was doubtless = *G. vestita* Wall. Cat. 1105, which again is probably a form of *G. celtidifolia* Juss. Ann. Mus. iv. 93.

G. excelsa Vahl belongs to a different section of the genus, and is a native of the Arabian peninsula, where it was discovered by Forskâl, who described it (Fl. Ægypt. 105) as *Chadara arborea* = *Grewia arborea* Lamarck, Encycl. Meth. iii. 45 (1789); having lately been rediscovered by M. Deflers it was redescribed and named by him as *G. dubia* (in Bull. Bot. Soc. de France, xlii. 30).

G. excelsa of Prain, *Bengal Plants*, i. 283, as regards the Chota Nagpur and Singhbum localities is probably = *G. Rothii* DC. (Prodr. i. 509): the Chittagong habitat belongs to "*G. vestita* Wall." *G. excelsa* Mast. in Hook. fil. Fl. Br. Ind. i. 385 consisted partly of *G. Rothii* DC. and partly of *G. vestita* Wall., so far as the Asiatic material is concerned: the African citation relates to a quite different species. The true *excelsa* seems to be restricted to Yemen, and *G. Rothii* to southern and central India. The *G. excelsa* of Masters (non Vahl) was identified by him as the *G. salvifolia* of Roxb. Fl. Ind. ii. 587, which is *G. Rothii* DC., and as regards the bulk of his material this is correct, but the *G. salvifolia* of Roxburgh (in the *Flora Indica*) is not the *G. salvifolia* of the younger Linné (which was an *Alangium*), nor of Heyne (ex Roth, Nov. Spec. 239) which is *G. Damine* Gaertn. (De Fruct. ii. 113, t. 106). *G. salvifolia* of Masters (Fl. Br. Ind. i. 386) is in part = *G. Damine* Gaertn. "*G. salviæfolia* Heyne" of Prain, *Bengal Plants*, i. 284, is partly *G. Rothii* DC. In Engler's Jahrb. xlv. 176, Burret ("Die afrikanische Arten der Gattung *Grewia*") suggests that *G. salvifolia* Heyne may be identical with *G. bicolor* Juss. in Ann. Mus. iv. 90. Whether *G. bicolor* Juss. may not occur in South India is a question, but the true *bicolor* of Western Africa is amply distinct from either *G. Rothii* DC. or *G. Damine* Gaertn.

Roxburgh most probably accepted his "*excelsa*" on Buchanan's authority; at all events, he did not remark on the likeness of its foliage to some states of the highly variable *G. rotundifolia* Juss. in Ann. Mus. iv. 92, which is the "*orbiculata*" of Prain (*Bengal Plants*, i. 283, sp. 227), following the *Flora of British India*, i. 386, an identification, however, which rests on a misapprehension by Masters of the paper in which Willdenow refers to an unknown *Grewia* for which Rottler had proposed the name of "*orbiculata*."

G. rotundifolia Juss. abounds in parts of Coromandel, and its omission from the *Flora Indica* is most likely due to its having been regarded in the first instance by Roxburgh as a form of his "*G. arborea*," and so ultimately merged in "*tiliæfolia*."

(5) No. 7, Fl. Ind. ii. 586, "*G. asiatica* Willd. 2, 1166." This covers at least two distinct species, one of which—the Calcutta Garden type—is apparently = *G. subinæqualis* DC., the other being the original *asiatica* of Linné, a garden plant of western and southern India. It is uncertain what the wild plant, or plants, which Roxburgh referred to his "*asiatica*," may have actually been, but the true *asiatica* is not native, so far as is known, in any part of India proper. The Chota Nagpur locality of *Bengal Plants* may belong to *G. subinæqualis*, or to a remarkable form from the Western Ghats and Central India, which is provisionally referred as a variation to *G. tiliæfolia*.

G. vestita Wallich, also *G. elastica* Royle, reduced by Masters to his "*asiatica*," if not recognized as species, must fall under *G. celtidifolia* Juss.; they are altogether distinct from the Linnean *asiatica*, and also from the Calcutta Garden plant here identified with *G. subinæqualis* DC.

G. asiatica Linn., *G. subinæqualis* DC., and *G. vestita* Wall. (with the other races which the writer would group under *G. celtidifolia* Juss.), also *G. tiliæfolia* Vahl and *G. rotundifolia* Juss. are quite unknown in Africa, though *G. asiatica* Linn. has been cultivated in the Mascarene Islands. The plants referred in the *Flora of Tropical Africa* to *G. asiatica* belong to other species, none of which occurs in India.

G. celtidifolia has a wide range in the Indo-Malayan region; if we reduce to it Royle's *G. elastica*, it extends from the Indus basin in the west to Siam and the Malay Islands, if not to the Philippines, eastwards.

(6) No. 8, Fl. Ind. ii. 587, "*salvifolia* R." This is = *G. Rothii* DC., and is not = "*G. salvifolia* Heyne in Roth, Nov. Sp. 239," ex Masters in Hook. fil. Fl. Br. Ind. i. 386, which is primarily intended to apply to *G. Damine* Gaertn. (*i. e.* the true *G. salvifolia* Heyne ex Roth, *l. c.*), but the description partly covers "*G. bipar-*

tita" (Roxb. ined.), which is really = *G. carpinifolia* Mast. in Hook. fil. Fl. Br. Ind. i. 387, non Juss., also in part his "*pilosa*" (non Lamarck) in the same, i. 338, and is properly = *G. flavescens* Juss.

In the *Flora of Tropical Africa*, *G. flavescens* Juss. comes partly under "*G. pilosa*" (Masters non Lamarck), partly under "*carpinifolia* Juss."

Roxburgh's "*salvifolia*" was of course quite different from that of the younger Linné, which was not any *Grewia*, but, as Roxburgh was aware, an *Alangium*. In *Bengal Plants*, No. 234, "*G. salviæfolia* Heyne," refers manifestly, from the characters, to *G. Rothii* DC., but the localities suggest that it was intended to include also *G. helicterifolia* Wall. (ex Royle), *G. polygama* Roxb., and perhaps *G. Damine* Gaertn., the last being, as already explained, the true *salvifolia* of Heyne ex Roth, which the writer looks on as distinct from *Rothii* DC., although forms occur that seem almost to connect them. *G. polygama* is quite distinct from *G. Damine*, and more markedly still from *G. Rothii*; it is less easy to mark it off from *G. helicterifolia*. The distinctive characters can be left for the present, but the geographical distribution of the two groups may be noted as follows:—

BICOLORES.

(*a*) *G. bicolor* Juss. In the drier parts of western and central tropical Africa from Senegal to the Upper Nile basin: a tree. Perhaps also (very locally) in South-western India.

The forms ranked as varieties under this species in Burret's monograph from East Africa and Abyssinia are regarded by the writer as distinct species.

(*b*) *G. Rothii* DC. (Synon. *G. salvifolia* Roxb. Fl. Ind. ii. 587, non Linn. fil., nec Heyne ex Roth; *G. excelsa* Masters, pro pte., non Vahl.)

Drier parts of tropical and subtropical Southern and Central India from the Carnatic tableland to the North-western Vindhyas: a tree.

(*c*) *G. Damine* Gaertn. (Synon. *G. salvifolia* Heyne ex Roth, non Linn. fil., nec Roxb.; sed (descr. emend.) Mast. in Fl. Br. Ind. i. 386.)

Ceylon. Dry tropical and subtropical Western India from Madras to the Indus basin: a small tree, reduced in the north to a stunted bush on limestone hills at 1500–4000 ft. above sea-level. There are very near but apparently distinct forms from the extreme south of tropical Africa.

HIRSUTÆ.

(*d*) *G. helicterifolia* Wall. (ex Royle, Ill. 104, sphalmate "*helicterifolia*").

Savannahs and low hills in extra-tropical North India from the Rajmahals to the Indus basin: a twiggy, subdiœcious shrub, sending out fresh shoots annually or periodically.

(*e*) *G. polygama* Roxb. non Pierre in Flor. Forest, pl. 166 and text relating to pl. 167. (Synon. *G. helicterifolia* Wall. Cat. No. 1090 A, non ex Royle.)

Hilly places in Bengal and Assam: a rather low shrub, possibly an eastern race of the preceding.

(*f*) *G. hirsuta* Vahl, non Smith in Rees Cyclop., nec (quoad local.) DC. Prodr. i. 509. (Synon. *G. tomentosa* Roxb. Fl. Ind. ii. 589, in adnot. sub No. 13, *G. polygama*; non Juss.)

A small tree or straggling shrub, the old stems quadrangular in section; abundant, especially on hills, throughout southern and eastern tropical India, disappearing towards the west and north.

Closely allied species occupy the regions further east, such as *G. humilis* Wall. (Irrawaddy to Shan States), *G. Lacei* Drummond & Craib in Kew Bull. 1911, 21 (North-east Burma to Siam); but none of the group have been observed west of the Suliman Mountains—within the Himalayan ranges proper—or beyond them northwards. It has been suggested that at least some of these "*Hirsutæ*" should be regarded as climatic forms of a single highly variable species, but except as regards *helicterifolia*, and *polygama* possibly, the writer, after study, cannot bring himself into agreement with this view.

Roxburgh's No. 12, "*G. pilosa*," has not been yet accounted for. As has been already shown, we cannot now ascertain what actual plant or plants he had before him; but the probability seems to be that the material from the interior parts of Bengal (corresponding to the Monghyr Hills habitat of *Bengal Plants*, i. 284) was *G. helicterifolia* Wall. ex Royle. Any way, no part of Roxburgh's "*pilosa*" has any concern with *pilosa* Lamarck, which is simply a synonym of *G. orientalis* Linn. (non Smith), nor yet with the *pilosa* of Smith in Rees Cyclop. xvii. No. 4, s. v. *Grewia*, which was really = *G. flavescens* Juss.

It remains to dispose of Roxburgh's "No. 8," which stands first in Carey, as also in the MSS. so far examined. It is proposed to deal with the original *oppositifolia*, which is the plant published by De Candolle under that name (Prodr. i. 509), and subsequently described by Wight & Arnott (Prodr. 79) as *G. emarginata*, in connection with *G. orientalis*, when the nomenclature of either "*oppositifolia*" will have to be considered. Meantime it is enough to show here the distribution of the two species thus:—

(I) *G. oppositifolia* Buchanan ex DC. Prodr. i. 509 (1824). Synon. *G. emarginata* Wight & Arnott, Prodr. Fl. Pen. Ind. Or. (1834) p. 79.

A shrub, often of scrambling habit, locally frequent on the main Carnatic plateau, southern tropical India.

(II) *G. oppositifolia* Roxb. hort. beng. p. 42, ex G. Don, Gen. Syst. i. 548 (1831). Synon. *G. oppositifolia* Buch. ex Roxb. Fl. Ind. (ed. Carey, 1832) ii. 583. *G. oppositifolia* Benth. ex Aitch. Cat. Pl. Panj. and Sindh (1869), p. 25. *G. oppositifolia* Roxb. Fl. Ind. ii. 583, ex Masters in Hook. fil. Fl. Br. Ind. i. 384 (1875), non Buchan. ex DC. Prodr. i. 509 (1824); also Collett, Fl. Siml. 63, cum fig. p. 62; also Brandis, *Indian Trees*, p. 95; also Gamble, *Indian Timbers* (1902 ed.), p. 109. *G. oppositifolia* Buch-Ham. ex

Roxb. Hort. Beng. ex Duthie, Fl. Upp. Gang. Plain, i. 111. *G. oppositifolia* Roxb. ex Watt, Comm. Prod. Ind. 624 (D. E. P. iv. 180).

A tree; its trunk attaining about two feet in diameter, cultivated or protected at 1000–5000 ft. along the outer Himalaya from East Nepal to Hazara (North-west Indian frontier); considered native in parts of Garhwal and Kumaon. Also found, but perhaps planted, in the Panjab Salt range, outer Suliman Hills, and in Beluchistan. Vernacular: (Garhwal to Kángra) "Behul"; Jama border to the Indus, "Dhamman" (*i.e.* "Bend"- or "Bow"-wood"). Valued for the foliage, which is stacked for winter fodder; also the drupes, which are eaten; and the elastic wood, which is used locally for sedan-poles, wattles, and the like, and sent to market for the purposes of coach-builders, club-makers, &c.

DORSETSHIRE PLANT RECORDS.

By C. E. Salmon, F.L.S.

In August, 1910, and in the same month of 1911, I was able to spend a little time studying the plants in the Swanage and Studland district, occasionally making excursions to localities further afield. The following notes are the results of various rambles; the records from the Poole neighbourhood were made in the company of the Rev. E. F. Linton.

I was somewhat disappointed that *Scirpus nanus* (= *parvulus*) should have eluded me both seasons; in 1910 Little Sea was swollen considerably with the heavy rains of that year, so much so that the normal margin was completely submerged, and quite un-get-at-able (*Polypogon monspeliensis* grew in a spot much more adapted to *Phragmites communis*!); in 1911 the summer caused the water to recede so much that the spots in which the *Scirpus* should have occurred were quite dry and sun-baked.

The numbers or letters before localities refer respectively to the divisions in Linton's *Flora of Bournemouth* (1900) and Mansel-Pleydell's *Flora of Dorset*, 2nd edit. (1895); supposed new county or divisional records are starred.

Glaucium flavum Crantz. 4. Old Harry.

Diplotaxis tenuifolia DC. *4. Old wall, Swanage.

Spergularia rupestris Lebel. C. Lulworth Cove.

Hypericum montanum L. 4. Sparingly near Old Harry.

Geranium Robertianum L. var. *purpureum* (Vill.). C. West Weare, Portland. I did not take sufficient notes of the plant when growing to be able to run the dried specimens down to any of the nine varieties of this mentioned by Rouy and Foucaud.

†*Melilotus indica* All. 1 (*a*). Near the Fever Hospital, Poole.

Sedum purpureum Tausch (*Fabaria* Koch). *C. A nice clump by the roadside between Wool and Wareham! *Mrs. Wedgwood.*

Epilobium lanceolatum Seb. & Maur. 1 (*a*). Broadstone.

Daucus gummifer Lamk. var. *intermedius* Corb. 4. Near Old Harry. Several very puzzling forms of *Daucus* grow on these cliffs, and deserve study. The majority seem to come under the above variety, which, Corbière observes, combines features of both *gummifer* and *Carota* (Fl. Normand. 1894, p. 264). The Rev. W. R. Linton in Bot. Ex. Club Report, 1893, 415, evidently has the same plant in view when he describes a new f. *convexa* of *D. Carota*. It seems, however, more convenient, I think, to keep the plant under *gummifer*, as the leaves—an important point in *Daucus*—indicate that rather than *Carota*. The umbels were concave in flower and convex in fruit, and the central flower purple. This last character would, if Rouy and Camus (Fl. de France vii. p. 239, 1901) be followed, prevent the Old Harry plant from coming under *D. gummifer* at all, but I think Prof. E. Forbes is right when he remarks, in the course of a most interesting paper on *Daucus* in Bot. Gazette, 1849, p. 294: "The presence or absence of a central red sterile flower is really a point of no importance, and is as variable in undoubted specimens of *D. Carota* as in the varieties here enumerated [*maritimus*]."

Œnanthe fluviatilis Colem. *5. River Trent, Wareham.

Artemisia Absinthium L. *5. Between Wareham Station and Morden Decoy Heath.

Lactuca virosa L. 4. Not only on the railway bank, Corfe Castle (*Bournemouth Flora*), but in other spots in the village—evidently spreading.

Erica ciliaris L. 4. Miss D. Powell showed me this on a heath close to Studland, and with it we found the interesting hybrid with *E. Tetralix*.

Limonium recurvum C. E. S. C. Seen in good quantity at Portland, the hot summer of 1911 evidently suiting it well.

Blackstonia perfoliata Huds. 4. Ballard Point.

Centaurium umbellatum Gilib. var. *capitatum*. 4. Growing with true *capitatum* near Tilly Whim.

Microcala filiformis H. & L. 4. Wytch Heath.

Gentiana Pneumonanthe L. 4. Heath close to Studland! *Miss D. Powell*.

Hyoscyamus niger L. 4. Old Harry.

Euphrasia borealis Towns. *4. Coast west of Tully Whim, in plenty.

Utricularia major Schmid. *4. Little Sea, flowering nicely in 1910: saw no trace of it in 1911!

Pinguicula lusitanica L. 4. Wytch Heath.

Mentha gentilis L. *5. Between Wareham Station and Morden Decoy Heath.

Calamintha montana L. var. **Briggsii* Druce. 4. Lane side, Ballard Down! *Mrs. Powell*.

†*Melissa officinalis* L. *4. By side of lane, Studland.

**Stachys palustris* × *sylvatica*. 4. Hedge east of Bushey. A good intermediate, growing very tall and leafy; flowers of *palustris* with leaves of *sylvatica*.

Chenopodium murale L. 1(*a*). Roadside near Lilliput. — *C. rubrum* L. 4. Between Swanage and Ballard Down.

Atriplex laciniata L. *1(*a*). Near Fever Hospital, Poole. *4. Studland. South Haven.

Salicornia appressa Dum. and *S.* **lignosa* Woods. *C. Between Wyke Regis and Portland.

Polygonum minus Huds. *4. Stoborough meadows.

**Rumex conglomeratus × pulcher*. 4. Near the fine old ruins, Corfe Castle.—*R. maximus* Schreb. *4. Stoborough meadows.

Orchis pyramidalis L. 4. East of Studland, near the sea.

Juncus obtusiflorus Ehrh. 5. Ditches near Wareham Station.

Eriophorum latifolium Hoppe. 4. In small quantity on the cliffs west of Tilly Whim.

Calamagrostis epigeios Roth. 4. A small clump in fine condition by a roadside near Rempstone Hall.

Ceterach officinarum Willd. 4. Old wall by a farm north of Swanage.

Lycopodium inundatum L. 4. By Little Sea, on east side.

LYME REGIS PLANTS.

By H. W. Pugsley, B.A.

The following plants, which were found near Lyme Regis in the early part of last September, have not, so far as is known, been hitherto recorded for that district. Owing to the exceptionally dry summer vegetation had suffered considerably, and other species were probably missed in consequence; and, although I searched diligently, I was unable to find a single plant of any *Fumaria*.

The abundance of *Carex pendula*, not only in the woods but on the cliffs and hedgebanks in every direction, is worthy of note; and *Pulicaria dysenterica* seemed to be the one plant everywhere that was not affected by the heat.

Of *Polygonum Raii*, which is recorded in the *Flora of Dorset* for both Lyme and Charmouth, I failed to find any specimens, and as large prostrate forms of *P. aviculare* occur on the beach at the former place, it is possible that these have been mistaken for it.

The plants noted in Dorset (v.-c. 9) are:—

Spergularia salina Presl. On Cobb and harbour piers at Lyme. — *S. rupestris* Lebel. On Cobb and piers at Lyme with preceding; also on walls above promenade.—*S. salina × rupestris*. One plant, with parents, on harbour pier at Lyme. This plant, which formed a considerable and very floriferous tuft, was wholly glandular and noticeably intermediate in its floral characters, the petals being rose-coloured, with a white base, much as in *S. salina*, but approaching those of *S. rupestris* in size. A curious feature was the production of the inflorescence into long and many-flowered cymes of shortly bracteated flowers, and of over one hundred and fifty capsules examined in these cymes, every one was found to be quite abortive.

Epilobium roseum Schreb. Roadside above Lyme.

Fœniculum vulgare Mill. Cliff above promenade at Lyme.

Petasites ovatus Hill. By the Lyme near Horn Bridge.

Artemisia Absinthium L. Hillside above Lyme, towards Charmouth.

Jasione montana L. Between Lyme and Charmouth.

Melissa officinalis L. By stream at Charmouth; an escape.

Plantago major L. var. *intermedia* Gilib. Cliffs east of Lyme.

Daphne Laureola L. Sleech Wood, near Uplyme; apparently native.

Glyceria procumbens Dum. Sea-front at Lyme.

Festuca rottboelloides Kunth. Lyme Cobb.

The following plants were seen in South Devon (v.-c. 3):—

Glaucium flavum Crantz. On shingle near Seaton (scarce).

Silene maritima With. and *Spergularia marginata* Kettel. Shingle saltmarsh at mouth of River Axe.

Lathyrus sylvestris L. Cliffs at Pinhay.

Rosa systyla Bast. Hedge at Uplyme.

Crithmum maritimum L. Bank at mouth of River Axe.

Œnanthe pimpinelloides L. Meadow near Uplyme Church.

Aster Tripolium L. Saltmarsh at mouth of River Axe.

Inula squarrosa Bernh. Cliffs at Pinhay.

Cynoglossum officinale L. Ware Cliffs, with *Iris fœtidissima*.

Verbascum Blattaria L. Abundant in small waste near Uplyme Church.

Plantago maritima L. Saltmarsh at mouth of River Axe.—*P. Coronopus* L. A form with bracts uniformly shorter than the calyx occurs under the cliffs at Seaton.

Salicornia europæa L. f. *patula* Moss and *S. lignosa* Woods. Saltmarsh at mouth of River Axe; the latter, confirmed by Dr. Moss, is a new county record.

Rumex pulcher L. Hilly pasture near Uplyme Church.

Calamagrostis epigeios Roth. Under cliffs at Seaton.

MYCOLOGICAL NOTES.

By W. B. Grove, M.A.

Uromyces flectens Lagerheim. It has often been noticed that the *Uromyces* occurring on *Trifolium repens* behaves differently in different localities, sometimes forming only teleutospores from May to October, at others forming both æcidia and uredospores as well during the same period. Lagerheim noticed that the form which produces only teleutospores had larger sori, remaining longer covered by the epidermis, and more predominant upon the nerves and petioles, on which they cause swellings and distortions. Therefore, in 1909, he published this as a distinct species, *U. flectens*, with the characters mentioned, *viz.* the nature of the teleutospore-sori and the absence of uredospores and æcidia.

Plowright (Ured. p. 125) records an interesting experiment which he performed; in October he brought a plant of *T. repens*, with the *Uromyces* upon it, indoors, and kept it there till the following summer. During all this time it produced only teleutospores on the leaves which it continued to bear. Evidently, though he attempts to explain the occurrence in a different way, he had before him *U. flectens*. There can be no doubt that many (if not most) of the British Uromycetes on *T. repens* belong to that species. I have never seen a British specimen of the æcidium, such as occurs in *U. Trifolii repentis*, nor is there one in the Plowright herbarium, or in that at South Kensington.

The teleutospores of *U. flectens* are, as described by Lagerheim and Sydow, either perfectly smooth or provided with a few largish warts, which are either scattered or arranged more or less irregularly in lines. It is, perhaps, these warted spores which have been mistaken for uredospores, from which, however, they can easily be distinguished by their thicker epispore (2 μ thick) and by their single apical germ-pore. The warts can be seen most distinctly when the spore is viewed dry. Also, in all the specimens I have examined, from Ireland and from Wales, as well as from this neighbourhood, most of the spores have a little well-marked collar or *apophysis* at the apex of the pedicel, just below the base of the spore, usually of the same brown colour as the epispore itself, while the short thin pedicel is nearly hyaline. How far this is peculiar to the species I cannot yet say.

There are thus three species of *Uromyces* in Britain (?) on *Trifolium*: *U. Trifolii repentis* Liro and *U. flectens* Lagh. on *T. repens*, and *U. Trifolii* Lév. on *T. pratense* and *T. hybridum*. The first has æcidio-, uredo-, and teleutospores; the second has teleutospores only, while the third has uredo- and teleutospores. The markings of the teleutospores appear to be identical in all three. In addition to these, I have a *Uromyces* from this neighbourhood on *Trifolium minus*, which belongs to a different group of species; I refer it to *U. striatus* Schröt., which is mentioned in the following paragraph.

UROMYCES LOTI Blytt. In August last Mr. T. B. Roe sent me from Scarborough a *Uromyces* on *Lotus corniculatus*, which agrees exactly with *U. Loti* Blytt. The teleutospores have a very small hyaline papilla, and are marked with minute warts arranged in undulating longitudinal lines. The sculpture of the spore approaches that of *U. striatus* Schröt., but is less marked. It belongs to the same group of species as the latter, having its æcidium, according to the experiments of Jordi, on *Euphorbia Cyparissias*; other species included in this group are *U. Astragali*, *U. Pisi*, and *U. Fischeri-Eduardi*, but the teleutospores of the two latter have their warts not arranged in lines and therefore do not appear striated, while those of *U. Astragali* have the striations less distinct (according to Sydow) than those of *U. Loti*.

UROMYCES AMBIGUUS Lév. In July and August I received from Yorkshire (*W. West*) and from Ireland (*H. C. Hawley*) specimens of a *Uromyces* on *Allium*, which belong to this species. It has often been placed under *Puccinia Porri* (Sow.), or under *P. mixta* Fckl. as forma *simplicior* Körn., but in Sydow's *Monographia* (ii. 263) it is treated separately as *U. ambiguus*. The main distinction, of course, lies in the one-celled teleutospores, but it also presents larger sori than the *Puccinia*, which remain always covered by the leaden-grey epidermis. In the specimens before me these are more conspicuous on the stems, on which they form lanceolate patches as much as 12 mm. long.

The difficulty lies in the fact that *P. Porri* produces an abundance of *mesospores* (one-celled teleutospores), which have the same appearance as the teleutospores of the *Uromyces*; they are, in fact, almost indistinguishable except by their much greater variability. But the *Puccinia* also produces its proper two-celled teleutospores, which can be found intermixed with the mesospores; while one may search in vain for such in the *Uromyces*, as I have done again and again.

While, therefore, it cannot be stated with certainty, in the total absence of culture-experiments, that the two species are really distinct, it seems better for the present to keep them so, especially as *P. Porri* has æcidia and the *Uromyces* has not, and there are other small differences as well. The *Uromyces* is stated to be confined to *Allium rotundum*, *A. Schœnoprasum*, *A. Scorodoprasum*, *A. sphærocephalum*, while the *Puccinia* is found on those and many other species of the genus.

Uromyces Lilii (Link) Fckl. Mr. C. W. Lowe gave me good specimens of this species during the past summer from his garden at Edgbaston. Here it occurred on the leaves of *Lilium candidum*; the host-plant has been in the garden for several years, but the parasite had not been noticed before. The spermogones and æcidia appeared together about May, on pale oblong or lanceolate spots, about half an inch long. These were followed in June by the sori of teleutospores; by this time the spots were larger, and on them the large black sori made a conspicuous object. The æcidial cups remain for a long time closed, and never become cup-shaped because the margin is not revolute. The teleutospores are rather globose, with a prominent hyaline papilla, and are striated with indistinct, often interrupted, lines or with warts arranged in lines. It is difficult to account for the occurrence of this species, unless the spores were wind-borne, since, so far as is known, no new introductions have been made into the garden by which it could be conveyed.

Dothidella Betulæ-nanæ (Karst). In a paper on "The Ecology of the Upper Driva Valley in the Dovrefjeld," by W. West & G. S. West, in the *New Phytologist*, vol. ix. (1910), p. 371, a figure is given of "leaves of *Betula nana* attacked by a leaf-blotch fungus (*Rhytisma* sp.)." At the time when this was published, the preserved specimens brought from Norway had been mislaid and could not be found. Since then they have been discovered, and by the kindness of Professor West I have examined them and find that the parasite is the imperfect stage of

Dothidella Betulæ-nanæ (see Sacc. Syll. Fung. ii. 629). Since the leaves were gathered in August, the spores are not formed, but the loculi and asci are perfect, and show unmistakably that they belong to this species, which is recorded by Karsten from Russian Lapland. The spores ripen on the fallen leaves in the following spring.

SHORT NOTES.

Cuscuta on Limestone Polypody.—During an extended visit to the French and Swiss Alps last summer I was struck by the abundance of Dodder in various places and upon a variety of plants, as, *e. g.* upon *Euphorbia Cyparissias* in quantity in the Zinal Valley and upon *Carduus defloratus* and *Teucrium montanum* in the same district. I did not critically examine the flowers, but believe the species was the common *Cuscuta Epithymum* Murray, except when growing on Lucerne and Clover, where Babington would have called it *C. Trifolii* I suppose. What I also believe to be *C. Epithymum* was actually parasitical upon a couple of fronds of the Limestone Polypody (*Polypodium Robertianum* Hoffm.). I am not aware that any kind of Dodder has yet been recorded as parasitical upon a fern; but Mr. Marre cites *Lotus corniculatus*, Lavender and other Labiates, *Hypericum*, species of Heath, *Achillea millefolium*, and even (according to Prillieux) Rye-grass, as having been attacked by this species. An interesting and useful article upon "Dodder" and how to exterminate it, with two beautiful coloured plates of *C. Trifolii* and *C. epilinum* upon their hosts, appeared in the *Journal of the Board of Agriculture*, Sept. 1906. In 1907, in the Maritime and Dauphiny Alps, I found at least two kinds of Dodder growing in hot places up to 7000 ft., but I gave the specimens away later without determining with certainty the species of this perplexing genus.—H. Stuart Thompson.

The "Cotyledon Gall" of Quercus pedunculata.—This gall was discovered as late as 1877, on *Q. Cerris*. This species is unknown to me within many miles of Cadney-cum-Howsham, North Lincolnshire. Yet, under a *Q. pedunculata* tree, my son picked up some acorns galled by *Andricus glandium* at Howsham, on October 27th. According to the late E. T. Connold, "Cameron says 'they take from three to four years to arrive at maturity.'" Can the prolonged heat of this summer have caused an exception to this rule? My reason for asking is simple. In one of the acorns found there was a hole like that made by the beetle *Balarinus nucum* in the hazel-nut. The plurilocular but unilarval cells were empty. There is, however, another supposition. Can it be that, owing to the late warm summer, parasites ("species undetermined," Connold says) have destroyed the pupæ and departed by the hole observed?—E. A. Woodruffe-Peacock.

Channel Island Plants.—Among the treasures in Kew Herbarium awaiting the industry and leisure of an enthusiastic critical botanist are the voluminous (thirty-two volumes) unpublished manuscripts of Gay, and the contents of his own herbarium, to many of the specimens of which are attached interesting and valuable critical notes. In searching among the manuscripts for any details about British plants, I discovered an account of Gay's visit to the Channel Islands in 1832, with a list of the plants which he observed. With the exception of Lagasca's string of absurdities and errors (about sixty species), it is the earliest and first list of Channel Island plants since the eleven species supplied by Sherard for Ray's *Synopsis.* I am extracting from Gay's MSS. what may be of interest from the point of view of Lester's *Fl. of Jersey* and Marquand's *Fl. of Guernsey.*—F. N. Williams.

Mimulus moschatus L.—On September 19th, 1911, I found this in the Wood of Houghton, Alford, Aberdeenshire. It was then in full flower, with slight smell. It is growing in various places: in an old dyke on the wayside; in a ditch for conducting water; and among the herbage in a wet or damp hollow.—Wm. Wilson.

Salicornia lignosa Woods (see p. 179).—In September of this year I found *Salicornia lignosa* at the Bouche d'Erquy, north Brittany. This is a new record for France. Mr. H. W. Pugsley recently sent me a specimen of it from South Devonshire. *S. lignosa* is now known to occur in England (from Norfolk to South Devonshire), Brittany, and Algeria.—C. E. Moss.

Cirsium acaule × arvense in North Hants.—A plant of this interesting hybrid is in Miss Palmer's herbarium. She gathered it on Sutton Common, North Hants, v.-c. 12, September 7th, 1897. It is the *Carduus Gibsoni* H. C. Wats.—G. C. Druce.

Erica ciliaris in Devon.—On the 30th of July I found this plant in the parish of North Bovey, v.-c. 3. This is a new county record for Devon.—K. M. Toms.

REVIEWS.

British Fungi, with a Chapter on Lichens. By George Massee, with forty coloured plates by Ivy Massee. 8vo, cl., 551 pp. London: George Routledge & Sons, Limited. 7*s.* 6*d.* net.

In a short preface Mr. Massee tells us that "the primary object of this book is to enable the reader to determine the names of our indigenous mushrooms, toadstools, &c." No more competent author could have undertaken such a task, and on every page we have evidence of intimate knowledge of the plants discussed.

The introductory chapter gives a general survey of mycology—the distribution, fruiting forms, and life-histories, &c., of the different groups of fungi. A second chapter is devoted to the explanation of the special terminology used. An account of classification—mainly of the larger fungi—follows, with a detailed key of the families in the order Basidiomycetes. Mr. Massee then returns to more general information, and in several chapters discusses the collecting and preserving of specimens, the diseases of the higher plants caused by fungi, and other matters of interest. In Part ii. he takes up again the classification already outlined in an earlier chapter. In a second edition of the book the chapter on Classification should be placed next to Part ii., so that the student may not be suddenly confronted with an apparently unrelated and unexplained "*Agaricaceæ.*" Still another improvement might be made by using differences of type in the headings to emphasize the various divisions. It is very bewildering to find Basidiomycetes, Hymenomycetes, *Agaricaceæ*, *Polyporaceæ*, &c., all figuring in type of equal importance.

A key to the genera is given under each family or subfamily. In addition, Mr. Massee writes a connected account of the distinctive features of each genus, pointing out in a graphic and interesting way not only the affinities but the differences between closely allied genera. Such descriptive summaries should delight the student; they cannot be too highly praised. Any artificial arrangement of genera is sure to separate nearly related groups; for instance, *Russula* follows *Tricholoma*, and is divided from *Lactarius*, its close ally, by *Mycena*, *Collybia*, and *Marasmius*. Such non-natural sequences should have been avoided.

When we come to the descriptions of species, we find them shortly but quite clearly expressed, only there are no guiding headlines, and no indication on many pages as to the genus under discussion except the initial letter. This is a serious drawback to the usefulness of the book.

Many of the notes and descriptions seem to have suffered from too hasty compilation, as if there had been no time for exact statements, and no opportunity for revision. We are instructed, for instance, how to make spore-prints (p. 34), and advised to keep them as records, but the essential part, *viz.* floating the prints on diluted gum in order to fasten down and preserve the spores, is left out. Under *Helvellaceæ* (p. 25) we read of species of *Helvella*, "commonly known as Morels," and on the following page we are wrongly told that all the species of *Hypoxylon* are black in colour. Again, we find it stated under *Clavariaceæ* (p. 29) that "*Sparassis* is considered as a delicacy, and several other species are edible"—a sufficiently confusing statement.

Mr. Massee strongly advises solitary collecting as being preferable to joining a fungus foray (p. 35), and then a little later (p. 67) he informs us that "the assistance of a more experienced person is invaluable to the student." This is undoubtedly true, but few students can have the privilege of a private tutor, and they must rely on the joint fungus foray, where much help is given and received.

Throughout the book there are helpful explanatory notes full of insight and understanding, as, for instance, under *Tremelli-*

naceæ, where we read that, "owing to the absence of sugar in the tissues, members of the *Tremellineæ* are not attacked by the larvæ of insects in the field, consequently, when collected for preservation, they should simply be allowed to shrink until they are perfectly dry and rigid." Such an illuminating remark makes us almost forgive the confusion of nomenclature—*Tremellaceæ* (p. 29), *Tremellinaceæ* (p. 442), and then *Tremellineæ* as above (p. 443). These changes of termination are puzzling to the student.

We could wish that Mr. Massee had entirely left out the Lichens, but as the page-heading is still "British Fungi," some notice of the group was evidently felt to be necessary. The bright and vivid sketch which he gives of these peculiar plants is too short to be of much real value, and is marred by several palpable errors. He states that "some lichens are injurious parasites on living leaves and branches," while all the evidence goes to prove that none of our British lichens are parasitic, and only one tropical species is a parasite on leaves. The Reindeer Moss (*Cladonia rangiferina*)—called *Cetraria rangiferina* on a preceding page—is rather a rare lichen in the southern counties of England; it is easily confused with *Cladonia sylvatica*, a plant which reindeer refuse to eat. *Coniocarpon gregarium* is figured at its brightest; Mr. Massee says it is not British, but any of our text-books would have furnished him with many home records.

The coloured illustrations should prove of great assistance to the beginner: a good plate is worth many pages of description; but there is a regrettable tendency to post-impressionism in the two plates of lichen drawings. The book is undated on title-page and preface, an omission that should be rectified in the next edition. In spite of the very obvious defects it should prove a serviceable handbook, and it will give a great impulse to the study of fungi in this country.

A. L. S.

PLANT GALLS.

Die Pflanzengallen (Cecidien) Mittel und Nordeuropas ihre Erreger und Biologie und Bestimmungstabellen. Von Dr. H. Ross, Konservator am Kgl. Botanischen Museum in München. 8vo, wrapper, pp. viii. 350, 10 plates and 233 figures in text. Jena: Fischer. Price 9 marks.

The publication of this work emphasizes the steady growth of interest in cecidology on the Continent and its comparative neglect in this country. Dr. Straton's well-known translation of Adler's classic account of the alternating generations of the oak *Cynipidæ*, and three books of lesser importance by the late Edward Connold (Oak galls, Vegetable galls, and Plant galls) comprise the published English literature; a classified text-book of British cecidology is a desideratum.

In the first part of his book Dr. Ross gives a series of essays on the various causers of galls and their biology, also methods of research, and the breeding and preservation of gall insects. The second part consists of a descriptive index of galls arranged botanically, not under families, but in alphabetical sequence of the genera. This arrangement ensures easy reference and at the same time serves to curtail the index, but it has some obvious disadvantages.

There are ten excellent black-and-white plates, with numerous figures, chiefly of familiar galls, drawn from nature by Dr. G. Dunzinger. An illustration of special interest depicts the curious and little known conical projections which occur on the hymenial surface of woody fungi, particularly *Fomes applanatus*. They are situated near the margin, are from 5–10 mm. high, and each has a central cavity. Dr. Ross appears to be in doubt as to the causation of these tubercles, but I think that Riedel discovered in 1900 that they result from the presence of the larvæ of a Dipteron belonging to the genus *Ditomyia*, species at present unknown.

The galls which arise from the presence of the larvæ of the gallwasp, *Neroterus osteus*, in the midrib of oak-leaves are poorly represented in Tafel vi. 134–136. They are of special interest because of their remarkable abundance during the past summer throughout the south of England. They were the cause of the very noticeable marginal discoloration of the leaves, which was so frequently, though quite erroneously, attributed to the drought.

In Tafel i. fig. 12 we have a magnified view of the hairs which arise in the axils of the leaf-veins of *Æsculus Hippocastanum*, through the presence of the mite, *Eriophyes Hippocastani* Fockeu. The leaves of the horse chestnut are usually remarkably free from galls. Three species of mites give rise to pubescence on the leaves and inflorescence, and an unknown cecid is said to cause minute, hemispherical, brown bodies to appear (rarely) on the lower surface of the leaf. These are at present the only European records. It is well known that the leaves of the horse chestnut are quite exempt from attack by leaf-mining larvæ. The comparative absence of galls from the leaves of certain trees is a subject of great interest, deserving special investigation.

The inclusion of galls caused by fungi makes this work a valuable companion to Howard's monumental volume on *Les Zoocécidies des Plantes d'Europe*. Amongst those that are delineated are the remarkable outgrowths on the female inflorescence of the common alder caused by *Ascomyces alnitorquus*, and a "witches' broom" on birch attributed to the presence of *Taphrina turgida*.

It is pleasing to find but few changes in nomenclature. It may be noted that *Chermes* (*Adelges*) *strobilobius*, which is associated with the little greenish pineapple gall on the common spruce, is now placed in the genus *Cnaphalodes*.

Dr. Ross may be congratulated on having produced a textbook which will be of great value to European cecidologists.

E. W. S.

Links with the Past in the Plant World. By A. C. Seward, F.R.S. Pp. viii. 142. Cambridge University Press. 1911. Price 1*s*.

As his title declares, Professor Seward, according to the custom now familiar, concerns himself with the past more than the present and is chiefly anxious to trace the developments through which our existing plants may have attained their present form. The conclusions reached must of course always remain speculative, however reasonable the arguments supporting them may appear, and can never amount to certainty. Nevertheless, when the discussion is conducted, as in this instance, with scientific sobriety and fulness of knowledge, the result is both interesting and instructive, and may help to enlarge the narrowness of view which is apt to characterise the field botanist.

The little book is, in fact, full of interest and information, and enables us to realise many vital problems connected with evolutionary history, in particular that of geographical distribution, which Darwin considered so supremely important. We are constantly reminded that we must take into account the time when land bridges united countries now separated by water—as Ireland with Great Britain, and both with the Continent; as also of the part played by the Ice Age in affecting the flora of various regions. In an interesting introductory chapter evidence is given as to the age to which trees attain, and the time their timber endures. As to this it is noted (p. 10) that "the blocks of oak and beech, some of which are as sound as when first felled, recently discovered below the foundations of parts of Winchester Cathedral constructed at the end of the 12th or in the opening of the 13th century, are relics of Norman forests."

Most curious and striking is the final chapter on the Ginkgo—called from the character of its foliage the "Maidenhair Tree"—a strange growth, the true place of which in the plant-world has but recently been determined, and which in spite of the vast antiquity it has attained appears now to survive only in cultivated specimens and to be extinct in a wild state.

Various points may be noted which suggest a useful moral that should teach the necessity of caution in regard of speculations concerning the past course of evolution, the mysteries of which are certainly not rendered less mysterious by such observations as the following (p. 67):—

"The plants of the Palæozoic period, though often differing considerably from those of the same class in the floras of to-day, exhibit a remarkably high type of organisation.

"Some of the most abundant trees in the forest of the Coal Age are decidedly superior in the complexity of their structure, as also in size, to modern survivals of the same stock. . . . It is impossible to get away from the conclusion that the oldest Palæozoic flora of which we have an intimate knowledge must be the product of development of an age which is represented by a chapter in the history of the plant kingdom, at least as far removed from the beginning as it is separated from the chapter now being written.

"Examples might be quoted in illustration of the risks attending the determination of fossils by external features alone, but it may suffice to mention the case of a specimen originally described as a fragment of a Cretaceous Dinosaur (*i.e.* a reptile), under the name *Aachenosaurus multidens*. By the examination of thin sections this supposed bone was shown to be a piece of Dicotyledonous wood."

As will be seen, the style of the book is straightforward and business-like, but we cannot quite reconcile ourselves to the new-fangled nomenclature which converts the old familiar Scotch Fir into "Scots Pine."

J. G.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on November 2nd, 1911, Dr. D. H. Scott gave an account of the palæozoic fern *Zygopteris Grayi* (Williamson). The group of comparatively simple Ferns (Primofilices of Arber, *Cœnopteridæ* of Seward) to which this plant belongs is chiefly known by petrified specimens showing structure. Correlation with impressions showing the habit has seldom been possible; fronds, however, belonging to a *Zygopteris* have been identified. *Zygopteris Grayi*, a species founded by Williamson in 1888, is a rare fossil. A new specimen, from Shore Littleborough, in Lancashire, was found by Mr. Lomax last year, and series of transverse and longitudinal sections were prepared. The general structure of the Shore specimen is that typical of the species; there is a five-rayed stellate stele, corresponding to a 2/5 phyllotaxis; the leaf-trace bundles are given off from the arms of the main stele and each is accompanied by an axillary stele; scale-leaves or aphlebiæ are present on the stem and leaf-base, and adventitious roots are also frequent. The specimen is favourable for showing the characteristic internal xylem, consisting of small tracheides associated with parenchyma, both in the main and the axillary steles. The question whether this species belongs to *Ankyropteris* or *Etapteris*, as these genera are defined by Paul Bertrand, has been disputed. The new specimen is certainly an *Ankyropteris*, as shown by the presence of "peripheral loops" of small-celled xylem on the leaf-trace. Thus the view of Paul Bertrand is confirmed; it appears to hold good for all known specimens of *Z. Grayi*. The Shore specimen has a leaf-trace of crescentic form as seen in transverse section; in this respect it differs from the figured specimens of the species, in which the trace is approximately triangular. A crescentic leaf-trace, however, occurs in one at least of Williamson's type-specimens, so no specific difference can be based on this character. It has been suggested that the organ here called a leaf-trace is rather of the nature of the stele of a branch. The Shore specimen, however, shows manifest leaf-trace characters in this organ, while the analogy of other species likewise confirms Stenzel's original interpretation; the branch which is connected with the leaf-trace higher up in its course may therefore retain its traditional name of *axillary shoot*. The Shore specimen has thrown new light on the derivation of the peripheral loops, the distribution of the protoxylem, and the course of the strands supplying the aphlebiæ. *Zygopteris*, or, as we may now call it, *Ankyropteris Grayi*, is a highly developed member of the Primofilices, and presents interesting analogies with the curious genus *Asterochlæna*, recently described in full detail by Paul Bertrand. The relation to the stem of *Diplolabis Roemeri*, discovered by W. T. Gordon, is also of much interest, but seems to be collateral rather than direct.

At the same meeting Mr. Alfred O. Walker read a paper on the distribution of *Elodea canadensis* Michx. in the British Isles in 1909. He stated that *Elodea canadensis* Michx. is said to have been first seen in Ireland in 1836 and in Berwickshire in 1845. By 1850 it had become so abundant in many parts of the British Isles as to be a serious nuisance by choking up canals, watercourses, and drains, and all attempts to clear it out failed. It was found, however, that after a few years it died out or became comparatively scarce and feeble. Information on the subject is given in the paper from twenty-four counties in England and Wales, six in Scotland, and three in Ireland, showing on the whole that the plant has decreased of late.

The California Academy of Sciences has published (Jan. 20, 1911), in its report of the expedition to the Galapagos Islands in 1905–6, a botanical survey of the islands by Mr. Alban Stewart, botanist to the expedition. This forms a quarto volume of 252 pages, with a map and 18 plates, in which the novelties and more interesting plants are figured. The novelties include, besides forms of known species, new species of *Brachistus*, *Cissampelos*, *Euphorbia* (two), *Opuntia*, *Peperania* (two), *Scalesia* (two), and *Telanthera*. The nomenclature is in accordance with the Rules of the Vienna Congress.

We are glad to see that the new edition of Mr. J. W. White's *Flora of the British Coalfields* is announced for early publication. The work has been entirely rewritten and will now be entitled *The Flora of Bristol*. It will form a volume of about 700 pages, with three plates and a map, and will be issued to subscribers at 10*s*. net; names should be sent to the author, 18 Woodland Road, Clifton, Bristol.

The third number of the *Journal of Genetics*, dated Sept. 8 but only recently to hand, is as usual beautifully printed and its plates, especially those in colour, are of a high order of execution. The botanical article (of seventy pages) in the present issue is "Studies in Indian Cotton," by H. M. Leake, narrating a series of experiments regarding the colour of the corolla, the red colouring matter of the sap, the leaf factor, the type of branching and the length of the vegetative period, and the leaf glands; this is illustrated by numerous tables and two plates (one coloured).

We regret that, owing to pressure on our space, several communications and reviews are unavoidably delayed.

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CORRIGENDA.

P. 33, l. 17 from bottom, for "*densiflora*" read *Borœi.*
P. 38, l. 7 from bottom, for "C. H. Lett" read H. W. Lett.
P. 169, l. 15, for "fine" read fair.
P. 196, l. 16 from bottom, for "Dixon" read Druce; l. 22, for "former" read forma.
P. 200, l. 7 from bottom, for "T" read J.
P. 238, l. 2 from bottom } for "Miss" read Mrs.
P. 239, l. 6 from top }
P. 303, l. 12 from top, after "Journ. Bot." add 1910.
Supplement i., p. 33, lines 1–4: the distribution of *Limonium* is correctly given on p. 275.

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NOTES ON THE FLORA OF DENBIGHSHIRE.

BY

A. A. DALLMAN, F.C.S.

It is a somewhat remarkable fact that no detailed or representative account of the flora of Denbighshire has ever been published. At first sight this may appear rather singular, but one has to recollect the extensive area and the wildness and the inaccessibility of many portions of the county, the paucity of local observers, and the too general apathy of the Welsh in regard to natural history. Add to all these that the considerable but scattered existing sources of material and local information are found often in unexpected places, frequently none too easy of access, and one may perhaps realize to some extent the great difficulties which must be encountered in constructing such an account.

Several districts—as, for instance, Llangollen, the Creuddyn Peninsula, and the Colwyn Bay neighbourhood—have long been favourite resorts of the plant collector and botanist; but although the flora of these localities has been fairly well investigated and possesses (Colwyn Bay excepted) a considerable bibliography, it must be remembered that such districts only form a very small fraction of the area of the entire county. The extent of Denbighshire is given as 424,555 acres (663·4 square miles), but for biological purposes it is in excess of this estimate. This is owing to the occurrence of three anomalous districts, which are politically a part of Carnarvonshire, although entirely detached from that county and really situated in Denbigh. There can be no difference of opinion as to the Conway River and Valley forming a perfectly natural boundary on the west, and so the Creuddyn Peninsula (which includes the Orme's Heads) and a small area lying between Llanrwst and Eglwys Fach—both on the *east* side of the Conway—must be considered a part of Denbighshire. The remaining portion of "Carnarvon"—the parish of Llysfaen, situated between Old Colwyn and Llanddulas—must also be included in Watson's botanical vice-county 50. Mr. J. E. Griffith has dealt to some extent with the vegetation of the Creuddyn Peninsula in his *Flora of Anglesey and Carnarvon*, but he rather inconsistently ignores the two remaining isolated areas afore-mentioned. With these additions the district under review—*i. e.* the *botanical* county of

Denbigh—may be regarded as having an area of approximately 680 square miles.

Since deciding some two years ago to extend the scope of my Flintshire investigations with a view to the preparation of a joint flora of Flint and Denbigh, I find I have in no way over-estimated the difficulty of such undertaking. Substantial progress has been made however. In addition to field work, much time has been devoted to bringing together and systematically collating the widely scattered material existing in various publications and herbaria.

The list of Denbighshire plants which follows will to some extent fill the gap to which I have previously alluded, pending the completion of the Flora. It may be regarded as fairly representative of the less common Phanerogamia and Pteridophyta. I have also included all species which are not already recorded for v.-c. 50 in *Topographical Botany* or in Mr. Bennett's *Supplement*; these are indicated by an asterisk. The list only represents a small proportion of the material which has accumulated. I have omitted the commoner plants and book records, except certain notices which have appeared in local publications that might easily be overlooked.

Many records to which the name of P. Inchbald is appended originally appeared in Williams's *History and Antiquities of the Town of Aberconwy* (1835); Inchbald is also responsible for the much fuller list which appeared in 1861 in Parry's *Llandudno, its History and Natural History* (ed. i. 1855). The chapter on the local flora in the latter work bears the unfortunate sub-heading "Rare Plants," and I have little doubt that this has contributed to the gradual extermination of *Cotoneaster* and certain other uncommon species. Two sources have also been drawn upon for records credited to John Price—*Old Price's Remains* (1864) and *Llandudno and How to Enjoy it*; the latter bears no date, but seems to have been published some time between 1875 and 1880. The *Remains*, a somewhat eccentric production, contain a few scattered references to Denbigh plants, but the chief source of Price's records is his later work. Both Inchbald and Price appear to have confined themselves to the littoral portion of the county, and their records chiefly refer to the Creuddyn Peninsula.

In 1865 the Oswestry and Welshpool Naturalists' Field Club published their first and only Report (*Osw. F. C.*). This was edited by the Rev. W. Walsham How, M.A.—subsequently better known as the Bishop of Wakefield—and contains notices of various plants observed at field meetings during the years 1857–1864. Mr. How is chiefly responsible for the botanical portion of this work, to which he also contributed (pp. 61–63) a paper on the flora of the Great Orme's Head. To the *Powysland Club Collections, Historical and Archæological, relating to Montgomeryshire and its Borders* (vols. iv.–vi., viii.), an account of the parish of Llanrhaiadr-yn-Mochnant is contributed by Thomas W. Hancock. Vol. iv. (1871, pp. 223–225) contains an account of the flora of the parish, in which stations are given for a number of

Denbigh and Montgomeryshire plants. This list may probably be accepted as accurate in the main, but must be used with caution; of the plants mentioned which Hancock records, at least three are certainly errors—*Alchemilla alpina*, *Silene acaulis*, and *Geranium sylvaticum*.

I have elsewhere (*Journ. Bot.* 1908, 187) called attention to the existence of several books of MS. notes on the flora of Flint and Denbigh, preserved at St. Beuno's College, near St. Asaph. Certain Denbighshire records from these MSS. are hereafter indicated by the abbreviation *Fl. B.*=*Flora of St. Beuno's*.

It may be well here to indicate the chief bibliographical sources of information, although such records are excluded from the present paper. The *Philosophical Transactions*, vol. lxi. (1772), contains (pp. 359–389) a Letter from Richard Waring to Daines Barrington, which includes some interesting references to Denbighshire plants. Pennant, in *A Tour in Wales* (1810, 3, p. 142), supplies several early records* for the Creuddyn Peninsula. In Gough's edition of Camden's *Britannia* (1789) there is a short list of Denbigh plants (vol. ii. 587), but these are mainly drawn from Ray or other sources; in the Carnarvonshire list (pp. 562–564) eight Gloddaeth plants are mentioned. Bingley's *North Wales* (1804) contains numerous references to Denbighshire plants of which many are due to J. W. Griffith, of Garn, near Denbigh, who is also largely responsible for the records which occur in *Withering*. A few Denbigh species are noticed in the *Botanists' Guide* (1805), chiefly on Griffith's authority. A curious little work entitled *Faunula Grustensis* (1830) by John Williams, of Llanrwst (of whom some account is given in this Journal for 1910, p. 232) contains a list of plants of the Llanrwst neighbourhood; several of the stations are in Carnarvonshire. The *New Botanists' Guide* (1835 and 1837) supplies a very useful Denbighshire list (pp. 244–251, 634–635), for which J. E. Bowman, of Wrexham, was chiefly responsible; some Creuddyn Peninsula records are contained in the Carnarvonshire list. *The Phytologist* supplies occasional references to the flora of the area under review, and there are scattered notices of Denbighshire plants in the *Journal of Botany*, the most important being the Rev. W. Moyle Rogers's "Notes on Some North Wales Plants" (1886, 339, 363). To the fourth edition of *Jenkinson's Practical Guide to North Wales* (1887) Mr. Britten contributes a chapter (pp. lxxxi–xcix) on the botany of the area in question, and Mr. G. R. Jebb supplies some original notices of Denbighshire plants. The periodical entitled *Bye-Gones relating to Wales and the Border Counties* (Oswestry: Woodall Minshall) consists of matter which originally appeared under the above heading in the *Oswestry Advertizer*; these newspaper columns are reprinted yearly and are issued as a volume under the afore-mentioned title; they include a number of references to Denbighshire plants, mainly in connection with accounts of field club excursions. Caution is necessary in utilizing information from this source, more especially in regard to plants reported as having been found on excursions of the Offa Field Club: thus in the volume for 1898 (p. 338) a notice appears of an excursion to Overton-on-Dee and Erbistock, in which it is stated that quite a number of plants of *Primula farinosa* were seen in full bloom along the roadsides and river-banks! That this is no accidental *lapsus plumæ* is evident from the graphic description which the writer gives of the colouring of the blossoms.

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* These are all for Gloddaeth, where Pennant states that the plants in question were observed by Lightfoot; these records are identical with those contained in an account of Lightfoot's tour, which is preserved at the British Museum, and was published in this Journal in 1905 (pp. 290–307).

I am indebted to Mr. W. Whitwell for a copy of a booklet entitled *The Flora of Oswestry*, which contains a number of Denbighshire records, and was compiled by a former Secretary (a Mr. Diamond) of the Offa Field Club; some records in this are open to doubt. Mr. Whitwell writes (*in lit.*):—"One of Mr. Diamond's [Shropshire] entries struck me as most improbable (*Rubus Chamæmorus* for Selattyn Hill, near Oswestry). This hill is not more than 1000 ft. high, and the plant has never been recorded before. Mr. Diamond admitted that the source of the entry was a report of a club meeting, and that was based on the assertion of somebody that he had seen the Cloud Berry on the hill."

In 1896 there was issued a *Report of the Royal Commission on Land in Wales and Monmouthshire*, and the Secretary (Mr. D. Lleufer Thomas) has inserted an antiquated and practically useless list of plants said to occur in the Principality. A further list is contributed by the Rev. O. M. Fielden, M.A., but this contains no original Denbighshire records. In an Appendix to this Report, which was issued as a Parliamentary Paper in the same year, there is a useful historical account and bibliography (pp. 140–144) of the Flora of Wales. This was in great part the work of Mr. Britten, whose assistance Mr. Thomas entirely ignored; it is reprinted in this Journal for 1898.

Many records of Denbighshire plants are contained in various herbaria. The collections of Miss E. Potts (*Hb. Potts*) and the Rev. J. Harris (*Hb. Harris*), two former Chester botanists, are now in the possession of the Chester Society of Natural Science. Miss Potts's herbarium is contained in ten large volumes, and includes a number of Denbigh and Flint plants. Most of these appear to have been collected between 1830 and 1860. The Harris collection is also rich in Denbigh records, mainly from Llandrillo-yn-Rhos, Rossett, and Gresford. The herbarium (*Hb. Jones*) formed by Miss E. Foulkes Jones (Chester), formerly of Llansilin, has been carefully examined by Mr. Whitwell, who has kindly supplied me with a list of all the included Denbigh records; these are mainly for the Llansilin neighbourhood. The collection of the late Robert Brown (*Hb. Brown*), now at the Liverpool Museum, contains a few Denbigh plants. By the courtesy of Mr. R. H. Day (Cwm) and Mr. C. Waterfall (Chester) I have been able to inspect their respective herbaria (*Hb. Day*, *Hb. W.*), which have afforded useful information. The collections formed by John

Williams (presented to University College, Bangor, by his son) and Mr. W. Whitwell's herbarium are believed to include numerous Denbighshire records which yet require collation; this also applies to the collection preserved at St. Beuno's College.

Much information has been afforded by the kind co-operation of various local botanists and observers, and in this connection special acknowledgment is due to Miss F. M. Thomas and Dr. E. J. Haynes Thomas, of Chester. I have also to thank the Misses Payne of the same city for a list of alien and other species observed by them in the Glyn Ceiriog district in 1900. Mrs. New (Backford) and Miss H. M. Williams (Aston) have contributed a number of records, chiefly from the Creuddyn Peninsula. Dr. W. B. Russell (Colwyn Bay) very generously placed his notebook on the flora of the Colwyn Bay area at my disposal, besides rendering assistance in other ways; his notes and records extend over a period of many years and have proved very useful. Dr. H. Drinkwater, of Wrexham, has supplied some records mainly from that neighbourhood, while Mr. W. Hodge (Northwich) has communicated some notes in reference to plants observed by him chiefly in the littoral portion of the county. Mr. J. M. Harnaman (Alvanley) and Mr. Hodge are jointly responsible for a number of records of plants for the Llandegla and Ruthin districts. Very material aid has been rendered by Mr. W. Whitwell in various ways. The records credited to the late J. J. Ogle are taken from an unpublished paper entitled "Botanical Notes of Holiday Stays at Old Colwyn," which he read at a meeting of the Liverpool Botanical Society in 1909.

Last summer I spent a month in the county with a view to systematically investigating the flora, and I was also able to obtain some interesting observations in connection with local floral biology. I further succeeded in obtaining much new material bearing upon Welsh plant lore and local plant names, but in the present paper I have confined myself to the systematic aspect of the work. Cyffylliog was chosen as a centre for three weeks in August, this being near the middle of the county and in an area of which scarcely anything appeared to be known in regard to the flora. I then descended to the southern part, where I spent a week at the commencement of September in the Tanat Valley in company with Mr. G. Loftus, with Llanrhaiadr-yn-Mochnant as centre. A bicycle was taken with a view to facilitating the investigation of the extensive area, the greater portion being far from any railway; this proved useful on some occasions, but owing to the hill country and the wretched nature of the by-roads was of less advantage than I had anticipated. Owing to the result of an accident, which precluded much walking or climbing, I found it difficult to accomplish much during the last week or so, and consequently the detailed investigation of the mountainous country between the Tanat and Dee Valleys has had to be postponed. During the time I covered a distance of approximately seven hundred and fifty miles in the course of my excursions, and, having regard to frequent adverse weather and other circumstances, the botanical results obtained are not altogether unsatisfactory.

The present paper is concerned only with the Phanerogamia and Pteridophyta. The cryptogamic vegetation of the county has hitherto received scant attention, and I am uncertain as to whether it will be possible to include this within the scope of the work in view. I would take this opportunity of inviting assistance and information towards the complete Flora, as the co-operation of all local observers and botanists is essential to the successful accomplishment of the undertaking. The similarity between many Welsh place-names is sometimes a cause of trouble to the "Sassenach," so it is important to distinguish in the following list between such places as Nant-y-glyn (near Colwyn Bay) and Nantglyn (near Denbigh). Llanrhaiadr (in the Vale of Clwyd) must not be confused with Llanrhaiadr-yn-Mochnant, and care is needed in distinguishing the various Llanarmons. All records in this paper in which the River Clywedog is mentioned refer to the tributary of the Clwyd, which must not be confounded with the other Denbigh river of the same name which flows into the Dee not far from Wrexham.

Clematis Vitalba L. Hedgerow in Beach Road, Old Colwyn, *Ogle*; occurred as a ballast plant at Colwyn Bay some years ago, *Russell*; slopes of the Little Orme in front of Ty-ucha farm, about a quarter of a mile east of the Marine Hydro, Llanddulas, 1910, *Hodge*; Gronwen Wood, near Pen-y-llan Bridge, Erbistock, *Loftus*; a young plant among shingle on beach near Llanddulas; in a garden hedge between Ruthin Church and the Corwen road; in fair quantity in the hedge just beyond Rhewl, towards Denbigh; on the right bank of the Clywedog, five miles from Denbigh, close to Rhewl: thicket by first cross-roads north of Llandyrnog; waste ground by the church below the "Wynnstay Arms," Ruthin.

Thalictrum minus L. Pont-y-mwynwr, Llanferres, *Hb. Potts*; World's End, Eglwysegle Rocks, near Llangollen, 1865 (*Whitwell*), *Hb. Jones*. Limestone rocks near Llysfaen; the Leet.

T. flavum L. Pont-y-mwynwr, Llanferres, *Hb. Potts*.—Var. *majus* Crantz. Llansilin, 1875, *Hb. Jones* (probably var. *rufinerve* Lej. & Court).

**Adonis annua* L. Near Bettws-yn-Rhos, *Thomas*.

Ranunculus fluitans Sm. Mouth of River Ddulas.

R. Drouetii F. Schultz. In a pool at the lower and western end of the wood, Caerwys, where the stream is dammed up, *Hodge*.

**R. heterophyllus* Weber. An aquatic *Ranunculus*, which I believe to be this species, occurs in fair quantity in the Conway just below the railway bridge, between Llanrwst and Bettws-y-Coed. Already recorded for Denbighshire † by Mr. J. Griffith (*Fl. Anglesea*), "in a small pond near Deganwy."

R. peltatus Schrank. Pen-y-bont, 1870, *Hb. Jones*. Moelfre

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† Politically, Deganwy is in the county of Carnarvon, but in one of the three isolated portions before referred to, which for all scientific purposes must be regarded as part of Denbighshire.

Pool, 1867, and Plas uchaf [near Llansilin], 1876, *ibid.* Stream at Chirk Fish Hatcheries, 1909, *Hb. W.*

R. Lenormandi F. Schultz. Llansilin, 1867, *Hb. Jones.* By the river-side at Llanfihangel Glyn Myfyr; damp ground on Pincyn Llus above Cyffylliog; Moel-y-parc, south of Caerwys; on the hills north-east of Llandyrnog; by Llyn Llyncaws, at 2100 ft. altitude. Frequent in the hill country.

R. hederaceus L. Llansilin, 1871, *Hb. Jones*; common in ditches about Colwyn Bay, *W. B. R.*; near Nantglyn; in a little pool by the roadside just past Llewesog Mill, near Denbigh.

R. sceleratus L. Conway valley; Morfa Rhuddlan; Erbistock.

R. Flammula L. var. **pseudo-reptans* Syme. Not uncommon in the hill country.

R. auricomus L. Llansilin, 1867, *Hb. Jones.* Pont-y-mwynwr, Llanferres, *Hb. Potts*; Nant-y-ffrith; Llangollen neighbourhood; wood near Llanrwst; Manley Wood, Erbistock.

R. sardous Crantz. Below Pwll-y-crochan Woods, *Russell.* Near Foryd, 1910, *Hodge.*

R. parviflorus L. Llansilin, 1867, *Hb. Jones.* Also occurs in several stations on the north-western littoral portion of the county.

R. arvensis L. Glyn Ceiriog, *Payne.*

Trollius europæus L. About Pont-y-ddol on the Elwy, *Fl. B.*; most abundant on Elwy above Llansannan, *ibid.*; near Llandegla, *J. M. H. & W. H.*; by the Elwy, Llanfair Talhaiarn, *Russell*; near Llangollen.

Helleborus viridis L. Three miles from Ruthin, on the Corwen Road, July 16, 1861, *Hb. Harris.*

H. fœtidus L. Ruins of Valle Crucis Abbey, near Llangollen, May 13, 1871, *Hb. Harris*; Glan Tanat wood, *Hancock*; Pwllglas and Eyarth Woods, near Ruthin, *J. M. H. & W. H.*; railway embankment between Llangollen and Trevor; Maes Mynan Wood, near Caerwys; railway embankment opposite Berwyn Station.

Aquilegia vulgaris L. Glan-yr-afon Wood, Llanferres, *Hb. Potts*; Llangollen neighbourhood, 1859, *Osw. F. C.*; near Ruthin, 1860, *Hb. Harris*; Glyn Ceiriog, *Payne*; Chirk banks (*Leighton, Fl. Shropsh.*). Burton, near Rossett, *Thomas.* A few plants by the roadside in two places between Pont uchel and Ruthin.

Berberis vulgaris L. Occurs in more or less suspicious stations wherever I have so far observed it in the county. Hedgerow between Llangedwyn Church and the Post Office, *Loftus & A. A. D.*; plentiful at one place on the Denbigh side of Nant-y-Ffrith, *Hodge*; by a farm called "Finger," near Pont Deunant; near a cottage south-east of Capel Saron, between Nantglyn and Cyffylliog; by the roadside a little distance south-west of Clawdd Newydd; between Derwen and the station (planted); one shrub in hedgerow by roadside east of Llangwyfan; hedge near Erbistock; in the lane south-east of Gelli gynan near Llanarmon.

Nymphæa lutea L. "I think it occurs in fish-pond, Llyn-y-Fawnog," *Russell.* Moelfre Pool, near Llansilin, *Hb. Jones.* Still there, 1910, *A. A. D.* Llyn Creiniog above Llansannan. Llyn-y-Cwrt.

**Castalia alba* Wood. Moelfre Pool, near Llansilin, *Hb. Jones.* Still there, 1910, *Loftus.* North end of Llyn Sybert, *Price.* Llyn-y-Fawnog, *Russell.* Llyn Creiniog, above Llansannan.

**Papaver somniferum* L. Craig Amyllt, above Moelfre Pool, 1867, *Hb. Jones* (= β *glabrum* Hb. Wats.). Once at least by Elwy, below Pont-yr-allt-goch, *Fl. B.* Waste places, Llwyn-on Wrexham, *Drinkwater.*

P. Rhœas L. Llansilin, 1867, *Hb. Jones*, (= β *strigosum* Boenn.). Roadside, Colwyn Bay; very rare, *Russell.* Railway bank between Abergele and Llanddulas. Field by road in valley below Caerwys.

P. dubium L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llansilin, 1869, *Hb. Jones* (= *Lamottei* Bor.). Cornfield near Clawdd Newydd. Shingle by the Tanat. Near Llanrhaiadr-yn-Mochnant (= *Lamottei* Bor.).

**P. Lecoqii* Lam. Hedgebank in cornfield near Bryn Euryn, July, 1900, *Hb. W.*

P. Argemone L. On ballast at Colwyn Bay, *Russell.* Near Foryd, *Hodge.*

P. hybridum L. Cornfield near Rhos-on-Sea, *Russell.*

**Meconopsis cambrica* Vig. Queried in *Top. Bot.* In several spots along the Elwy, *Fl. B.* Llanrhaiadr-yn-Mochnant parish, *Hancock.* Neighbourhood of Llanrhaiadr-yn-Mochnant, 1858, *Osw. F. C.* Glyn Ceiriog, *Payne.* Bwlch gwyn neighbourhood, *Drinkwater.*

Glaucium flavum Crantz. Colwyn Bay neighbourhood, 1862, *Price.* Between Foryd and Llandudno in various stations.

**G. phœniceum* Crantz. Two or three plants in a small patch of waste ground in the station yard, Glyn Ceiriog, June, 1900, *Payne.*

Chelidonium majus L. Mochdre, 1868, *Hb. Harris.* Llansilin, 1867, *Hb. Jones.* Quarry behind Tan-yr-allt, Abergele, *Thomas.* Bryn Euryn and Coed Coch, *Russell.* Old Colwyn neighbourhood, *Ogle.* Trefnant; Pentre tafarn-y-fedw; Ruthin; Pont uchel; Cyffylliog; Clocaenog; Derwen; by the roadside about six miles from Corwen, towards Ruthin; Ruabon; near Caerwys; Chirk; Llanrhaiadr-yn-Mochnant; Rossett and Gresford, Ffrith neighbourhood; Erbistock; Llanarmon.

**Corydalis lutea* DC. Cefn rocks, *Fl. B.* By the lodge-gates a mile south of Ruthin, on the Llangollen road, 1910. About the Ferry House at Erbistock.

C. claviculata DC. Llanrhaiadr-yn-Mochnant neighbourhood, 1858, *Osw. F. C.* Occurs in several places on high ground above Colwyn Bay—*e. g.* Cilgwyn and above Flagstaff, *Russell.* Seen sparingly near Llanarmon Mynydd Mawr at 780 ft. elevation, *Loftus.* Side of Llansannan road, east of Foel Greon. Thicket by roadside close to a small quarry on the north side of the Clywedog, about a quarter of a mile east of Cyffylliog. Amongst furze by the lane east of Ffrith fawr, extending for about three-quarters of a mile north of Careg-y-gath. Roadside above Meifod, between Nantglyn and Cyffylliog. Roadside on the crest of hill between Ruthin and Clocaenog. In the woodland between Diffwys and Rhwng-y-ddwy-afon near Cyffylliog. Amongst the undergrowth on the "Roft," Marford.

Fumaria capreolata L. Llandrillo-yn-Rhos, 1868, *Hb. Harris* Gresford.—*a pallidiflora* Jord. Llansilin, 1867, *Hb. Jones.* Erbistock, *Mason.* Near the Marine Hotel, Colwyn Bay, *Russell.* Garden weed near Mochdre, *Hb. W.* Deganwy.

F. purpurea Pugsley. Near Nantglyn. Plentiful on bank by roadside above and south-east of Pont Ystrad, near Denbigh. Field near Llanrhaiadr-yn-Mochnant. Growing amongst aliens, Llanrhaiadr-yn-Mochnant Station.

F. Boræi Jord. Llansilin, 1867 (*Boswell*), *Hb. Jones.* Roadside between Ruthin and Pont uchel.

F. muralis Sonder. Garden weed, Ingleside, Colwyn Bay, 1900, *Hb. W.*

F. officinalis L. Llansilin, 1869, *Hb. Jones.* Llandudno, *Price.* Common in waste places about Colwyn Bay, *Russell.* Cornfield, Pabo Hill, 1900, *Hb. W.* Glyn Ceiriog. Abergele.

**Cheiranthus Cheiri* L. Colwyn quarries, *Russell.* Rocks and walls about Denbigh Castle.

Radicula palustris Moench. "Father Huson says it grows on the left bank of the Clwyd above Llannerch Bridge," *Fl. B.*

Barbarea vulgaris Ait. Llansilin, 1867, *Hb. Jones.* Llandudno, *Price.* Colwyn quarry, *Russell.* Llandegla, *J. M. H. & W. H.* Near Ruthin. Nantglyn. Glyn Ceiriog. Near Llanrhaiadr-yn-Mochnant.

**B. verna* Aschers. (=*B. præcox* Br.). Roads near Denbigh, *Fl. B.*

Arabis hirsuta Scop. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Great Orme's Head, *Osw. F. C.* Ruined walls, Denbigh Castle, 1873, *Hb. Brown.* Limestone hills near Llysfaen, *Russell.* Gallt Faenan, *Fl. B.* By the bridge, Pwllglas, near Ruthin, *J. M. H. & W. H.* About the "Loggerheads." Walls near Eyarth, near Ruthin. Llangollen neighbourhood. On limestone rocks in Nant-y-Ffrith.

Cardamine amara L. Near Marford, in a stream or ditch between the railway bridge and the Alyn, 1910, *Thomas & Williams.*

C. flexuosa With. Llansilin, 1867, *Hb. Jones.* Wood, Llanelian-yn-Rhos, *Russell.* The Leet (Denbigh end).

Erophila verna E. Meyer. Llandudno, *Price.* Llansilin, *Hb. Jones.* Colwyn Bay, *Russell.* About Llangollen. Llanrhaiadr-yn-Mochnant. Near Ffrith.

**E. præcox* DC. Little Orme, *Russell.* Nant-y-Ffrith, on limestone, 1910, *Thomas & A. A. D.*

Cochlearia officinalis L. Seashore between Pensarn and Llanddulas, 1872, *Hb. Brown.*

C. danica L. Llandudno Bay and Parade, *Price.* Coast at Llandrillo-yn-Rhos and walls inland, *Russell.*

**C. anglica* L. Little Orme cliffs, facing the sea, *Russell.* Near Llandudno Junction.

**Hesperis matronalis* L. Pentregwyn, 1868, *Hb. Jones.*

**Malcolmia maritima* R. Br. Several plants in company with other introductions by the sidings at Llanrhaiadr-yn-Mochnant Station, September, 1910.

Sisymbrium Thalianum Gay. Llandudno, *Price.* Nant-y-glyn, near Colwyn Bay, *Russell.*

**S. pannonicum* Jacq. Two plants with other aliens at Llanrhaiadr-yn-Mochnant Station, 1910.

Erysimum cheiranthoides L. Among rubbish, Colwyn Bay, *Russell.*

**E. orientale* (= *E. perfoliatum* Crantz). Waste ground in the station-yard at Glyn Ceiriog, June, 1900, *Payne.* Stony fields and waste places, Llwy-non, Wrexham, 1910, *Drinkwater.*

Brassica oleracea L. Plentiful on the Great Orme.

**B. Napus* L. Llandudno, *Price.*

**B. Rutabaga* DC. Llansilin, 1867, *Hb. Jones.*

B. nigra Koch. Waste places, Colwyn Bay, *Russell.* Near Abergele, 1910. Between Abergele and Rhuddlan.

B. alba Boiss. Llandudno, *Price.* Back of quarry, Denbigh, *Fl. B.* Colwyn Bay, *Russell.*

**Diplotaxis tenuifolia* DC. Observed by Dr. Russell some years ago on the ballast tip on the site of the present goods station at Colwyn Bay. The plant was accompanied by various other waifs and strays. A weed in Dr. Russell's garden, Belgrave Road, Colwyn Bay, 1900, *Hb. W.* Salisbury Road, Llandudno, 1909, *Hodge.*

Coronopus procumbens Gilib. Road near Rhôs Weir and also near Llysfaen, *Russell.* Roadside by the Ferry Hotel, Denbigh side of the Foryd, 1910, *Hodge.*

**Lepidium sativum* L. Flagstaff, Colwyn Bay, *Miss L. R. Cooke.*

**L. Draba* L. A ballast plant at Colwyn Bay, *Russell.* Railway embankment near Marchwiel Station, 1910.

**Thlaspi arvense* L. Above the tunnel between Llysfaen and Old Colwyn, *Ogle.* Llwy-non, Wrexham, 1910, *Drinkwater.*

[*T. alpestre* L. The various published records for this species as a Denbigh plant refer to a station in the neighbourhood of Llanrwst. This is really in Carnarvonshire.]

Teesdalia nudicaulis Br. Llansilin, 1867, *Hb. Jones.* Top of Nant Road, Colwyn Bay, below the cross roads, 1894, *Russell.* Near Llangollen.

Hutchinsia petræa Br. Great Orme, *Payne.* Eglwyseg Rocks, Llangollen.

**Crambe maritima* L. A single plant seen on the Great Orme by Mr. Hodge in 1909, despite the statement in the *Flora of Anglesey* that it has become extinct in this station.

Cakile maritima Scop. Formerly occurred on shore near Old Colwyn Station, *Russell.* Mouth of Clwyd, 1910, *Hodge.*—Var. **sinuatifolia* DC. (= *C. integrifolia* Koch). Occurs with the type on the shore to the east of Pensarn Promenade, *Hodge.*

Raphanus Raphanistrum L. Llandudno, *Price.* A ballast plant at Colwyn Bay, *Russell.*

**R. maritimus* Sm. Waste ground near the Baths, Llandudno, *Inchbald.*

**Lunaria biennis* Moench. Roadside, Pentregwyn, near Llansilin, *Hb. Jones.* By Llysfaen Station, 1863, *Price.*

**Reseda lutea* L. Garden wall at Glan Conway, 1896, *Russell.* A casual on waste ground by the station at Glyn Ceiriog, 1900, *Payne.*

R. Luteola L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llandudno, *Price.* Railway-banks between Llangollen and Ruabon, *T. Ruddy.* Quarry near Colwyn Station, *Russell.* On the railway below Porth-allt-goch, south of Tal-y-Cafn. In the limestone quarry a mile north-west of Ruthin. Hedge by road near Cotton Hall, near Denbigh. A few plants by bridge entering Rhewl from "Lady Bagot's Drive."

Helianthemum canum Baumg. Bryn Euryn, *Russell.* Plentiful on the limestone rocks south of Llysfaen.

H. Chamæcistus Mill. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* On limestone between Llysfaen and Old Colwyn, *Ogle.* Tower Hill, Abergele, and quarry behind Tan-yr-allt, *Thomas.* Cefn Rocks, *Thomas.* Limestone hills about Colwyn Bay, common, *Russell.* Limestone rocks south of Llysfaen. Limestone rocks near the "Loggerheads." Eglwyseg Crags.

Viola palustris L. Moelfre Pool, near Llansilin, 1867, *Hb. Jones.* Still there, 1910. Glan-y-don Bog, Colwyn Bay, *Russell.* Llyn Alwen; near Llyn Bran. Damp ground east of road between Clocaenog and Clawdd Newydd. Plentiful in swampy ground bordering Llyn-y-Cwrt. Bogland between Cerrig-y-Druidion and Glasfryn. Marshy ground north-west of Moel Arthur. Llyn Creiniog, above Llansannan.

V. odorata L. Glascoed Dingle, near Llansilin, 1867, *Hb. Jones* (f. *alba*). Plentiful in the lower dingle, *Miss E. F. Jones.* At Gresford, where the white is most abundant, *Hb. Potts.* Still there. Banks of the Alyn, near Gresford, 1871, *Hb. Harris.* Still there. Llandudno, *Price.* Gwersyllt, near the Mold road, *Drinkwater.* Bryn Euryn Quarry, *Russell.* Rhos (f. *alba*), *Russell.* Roadside banks between Henllan and Denbigh. Hedgebank near Ruthin on Cyffylliog road. Bank of lane below Derwen Hall. Roadside banks between Llanynys and Rhewl. Roadside south of Rhewl, towards Ruthin. Between Llandyrnog and Bodfari. Roadside near Llanrhaiadr-yn-Mochnant. Near entrance to the churchyard, Llangedwyn. Erbistock. Marford. Rossett.

V. hirta L. Llanferres, May, 1834, *Hb. Potts.* Pont-y-mwynwr, Llanferres, *Hb. Potts.* Llysfaen, *Russell.* Roadside at the upper end of Nant-y-garth, *J. M. H. & W. H.* Orme's Heads. Roadside banks between Henllan and Denbigh. Laneside east of Rhewl, near the Denbigh Waterworks. Near Tyddyn calchwr, between Ruthin and Cyffylliog. Limestone rocks in the highest part of the quarry, north-west of Ruthin. Llanarmon. Limestone rocks east of Pant-y-ffordd, north of Llandegla. Llandegla. Rocks near the "Loggerheads."

V. sylvestris Kit. Llansilin, 1865, *Hb. Jones.* The Leet, not far from the "Loggerheads."

**V. ericetorum* Schrad. (= *V. canina* L.). Deganwy neighbourhood, *Price.* — Var. **flavicornis* L. Sandhills behind the Ferry Hotel, the Foryd, Rhyl, 1910, *Hodge.*

V. tricolor L. Field by the Conway by Cwm Llanerch, between Llanrwst and Bettws-y-Coed. Among oats in a field by Frôn, north of Moel Rugoer. Near Clawdd Newydd.

V. arvensis Murr. Plas Newydd, Llangollen, 1876, *Hb. Jones.* Llandudno, *Price.* Colwyn Bay, *Russell.* Little Orme, *Hodge.* Fields near Cyffylliog. About Ruthin. Cornfield at Clawdd Newydd.

V. lutea Huds. Bwlch Agricola, Llanferres, *Hb. Potts.* The Gyrn, near Llansilin, 1876, *Hb. Jones.* Near Llyn-y-Fawnog, *Russell.* Eglwyseg Rocks. Very fine and plentiful on a common skirting the moorland, immediately above and south of a farm called Bryn clwyd, above Cyffylliog. Type only.

Polygala vulgaris L. Llansilin, 1866, *Hb. Jones.* Erbistock. Llanrhaiadr-yn-Mochnant. Cyffylliog.

P. oxyptera Reichb. Llansilin, 1866, *Hb. Jones.* Seen by Mr. Arthur Bennett. Boswell, to whom plants were also submitted, wrote to Miss E. F. Jones: "I think these specimens are rightly referred to *oxyptera*, but it is a curious elongated form, in habit somewhat resembling the continental *P. comosa*, but without the elongate bracts of that form."

P. serpyllacea Weihe. In a field adjoining wood in valley to left of road outside Llanrwst, towards Pentre tafarn-y-fedw. Near Cyffylliog.

Dianthus deltoides L. Llandegla, *J. M. H. & W. H.*

**Saponaria officinalis* L. Llanrhaiadr-yn-Mochnant parish, *Hancock.* Left bank of Elwy just above Pont-yr-allt goch, and on Chittenden's Reach, *Fl. B.* Shingle by Dee just above Erbistock, 1910. A large patch on hedgebank on lower road from Pentre tafarn-y-fedw to Llanrwst, close to the former place and not far from the main (Abergele) road. — Var. **puberula* Wierzb. A large clump on an expanse of waste land and common on the north side of the Tanat—not far below the confluence with the Irwych—near Glan Tanat-isaf, 1910, *Loftus & A. A. D.*

Silene maritima With. Pensarn, *Thomas.* Great and Little Orme.

**S. conica* L. Was noticed by Dr. Russell in 1894 on the ballast tip at Colwyn Bay, in company with other casuals. The station is now destroyed.

**S. anglica* L. Llangollen, 1910, *Drinkwater.*

S. nutans L. In various stations on the limestone in the north-western extremity of the county. I believe *S. dubia* Herbich also occurs here.

Lychnis Githago Scop. Mochdre, 1868, *Hb. Harris.* Common at Llansilin, *Miss E. F. Jones.* Railway cutting, Colwyn Bay, *Russell.* In quantity among oats below Diffwys, west of Cyffylliog, at 840 ft. elevation, 1910.

**Cerastium tetrandrum* Curt. Bryn Euryn, *Russell.*

C. semidecandrum L. Great Orme, *Hodge.* Shore near Colwyn Bay, *Russell.*

C. arvense L. Bryn Euryn, *Russell.*

Mœnchia erecta Gaertn. Hilly ground about half a mile south of the Berwyn railway station, Llantisilio, Vale of Llangollen, May 27th, 1875, *Hb. Brown.* Hills above Pwll-y-crochan, *Russell.*

Stellaria aquatica Scop. Rossett, *Ellis.*

**S. neglecta* Weihe. Road to Moelyrch from Rossydd, 1872 (fide *Boswell*), *Hb. Jones.*

S. uliginosa Murr. Llansilin, 1867, *Hb. Jones.* Glan-y-don Bog, Colwyn Bay, *Russell.*

Arenaria verna L. On both the Orme's Heads.

A. serpyllifolia L. Llandrillo-yn-Rhos, Orme's Head, and Coed Coch, *Russell.* Between Pensarn and Llanddulas. Near Ruthin.

A. leptoclados Guss. Quarry near Ruthin. On shingle by the Tanat.

A. peploides L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Between Rhyl and Abergele, *Fl. B.* Pensarn shore, *Thomas.* Between Pensarn and Llanddulas.

Sagina apetala Ard. Near Cyffylliog.

S. procumbens L. Colwyn Bay neighbourhood, 1862, *Price.* Above Diffwys, at 1200 ft. elevation. On the obelisk on the summit of Pincyn llus, Cyffylliog. Ruthin.

S. subulata Presl. Llanferres, *Hb. Potts.* High, wet, rocky ground above Elwy Valley, between Coed Coch and Llangerniew, *Russell.* On the Llanrwst Road [between Colwyn Bay and Llanrwst], *Russell.*

S. nodosa Fenzl. Llandrillo-yn-Rhos, *Russell.* Llandegla, *J. M. H. & W. H.*

Spergula arvensis L. Cornfield, Llansannan. Llanrhaiadr-yn-Mochnant. Cyffylliog.

**S. sativa* Boenn. Field below Diffwys, at 840 ft. Cornfield, Llanbedr. Clawdd Newydd and Cyffylliog. On shingle by the Tanat.

Spergularia rubra Pers. Roadside near Moelfre, 1867, *Hb. Jones.* Colwyn Bay, *Russell.*

S. salina Presl. Llandrillo-yn-Rhos, *Russell.* Great Orme, *Hodge.*—Var. *β media.* Glan Conway, *Russell.*

S. rupestris Lebel. Llandrillo-yn-Rhos, *Russell.*

Hypericum Androsæmum L. Colwyn Bay district, 1862, *Price.* On Elwy, left bank near first plank bridge above Pont-yr-allt goch, and near "Julia's Bower," *Fl. B.* On left bank of Elwy, on side of stream which works the water-wheel below Wygfair, *ibid.* Woods to right of small stream below Cefn, *ibid.* On the roadside near Nant [near Llanrhaiadr-yn-Mochnant], *Hancock.* Near Llangollen, 1859, *Osw. F. C.* Glyn Ceiriog, 1900, *Payne.* Great Orme, 1909, *Hodge.* Thicket, Nant-y-glyn, near Colwyn Bay, *Russell.* By the side of the Afon gallty gog, just above its junction with the Conway. Sparingly by the Conway between

Llanrwst and Bettws-y-Coed. Bank on south side of Pont-yr-allt goch. Woodland by "Lady Bagot's Drive" between Pont uchel and Rhewl.

H. maculatum Crantz. (= *H. dubium* Leers). Llandegla, *J. M. H. & W. H.* Limestone rocks near the "Loggerheads." Llanarmon. Llangollen.

H. quadrangulum L. (= *H. tetrapterum* Fr). Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Nant-y-glyn wood, *Russell.*

H. pulchrum L. Llangollen, 1859, *Osw. F. C.* Castle Hill, Llangollen, 1861, *Hb. Harris.* Still there. Llansilin, 1867, *Hb. Jones.* Old Colwyn neighbourhood, *Ogle.* Mochdre Valley, *Russell.* Roadside above Llanrwst, towards Gwytherin. Between Ruthin and Cyffylliog. Between Cyffylliog and Denbigh. Near Nantglyn. Near Ruthin. Glyn Ceiriog.

H. hirsutum L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Grassy wall-top between Chirk Fish Hatcheries and Chirk village, 1909, *Hb. W.* Llandegla, *Hodge*; Eyarth Woods, near Ruthin, *ibid.*; roadside near the late Sir H. Stanley's old home, Glascoed, near St. Asaph, 1910, *Hodge.* Between Henllan and Denbigh. Wood by Elwy, north of Pont-yr-allt-goch. Craig Wood, Denbigh. A few plants between Clocaenog and Ruthin. Between Llandyrnog and Bodfari. Near Llanarmon. On limestone rocks above and east of Pant-y-ffordd, north of Llandegla.

H. montanum L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Not unfrequent around Llandudno, *Inchbald.* Llangwstenin Lane, 1907, *Hb. W.* Nant-y-glyn wood, *Russell.* Railway embankment, Gresford, 1909, *Hodge.* Little Orme, *ibid.*

H. elodes L. Marshy ground, Black Dingle, Colwyn Bay, *Russell.* Marshy ground, Llyn-y-Fawnog, *ibid.* Llyn Creiniog. Bogland between Cerrig-y-Druidion and Glasfryn. Swamp by Pont Petrual, south-west of Clocaenog.

**Althæa officinalis* L. Salt marshes [Llandudno neighbourhood], rare, *Inchbald.* A writer in *Science Gossip* (1884) records this as occurring "by the canal and the river at Llangollen."

**A. hirsuta* L. Occurred in waste ground in the station yard at Glyn Ceiriog, in June, 1900, along with *Glaucium phœniceum*, *Potentilla norvegica*, *Linaria minor*, and other casuals, *Payne.*

**Lavatera arborea* L. Great Orme. Doubtfully native here.

Malva moschata L. Llansilin, 1867, *Hb. Jones.* Still there. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Dry bank, Llansantffraid, Denbighshire, 1874 (*Brown*), *Hb. Brown.* Derwen Mill, near Meiarth Hall, *Thomas.* About Coed Coch and Llanelian-yn-Rhos, *Ogle.* Wood, Nant-y-glyn valley, *Russell.* Roadside by Tal-y-Cafn Station, 1909, *Hodge.* Eyarth Woods, near Ruthin, *J. M. H. & W. H.* Between Chirk Fish Hatcheries and Chirk village, 1909, *Hb. W.* On shingle by the Tanat, *Loftus & A. A. D.* Bank in field south of Llanrwst, close to the confluence of a little stream and the Conway. Roadside near Taldrach, south-west of Denbigh. Between Ruthin and Pont uchel. Near Nant bach, above Cyffylliog. Clocaenog. Railway embankment between Denbigh and Llanrhaiadr. Cyffylliog. Derwen. Between Pont uchel and Llanynys. Limestone quarry north-west of Ruthin. By Derwen Hall. Roadside about six miles from Corwen, towards Ruthin. Near the "Loggerheads." A plant or two seen near Llanbedr, 1910. Near Llanrhaiadr-yn-Mochnant. Tanat Valley. Between Llanrhaiadr-yn-Mochnant and Llansilin. Erbistock.

M. sylvestris L. Llansilin, 1867, *Hb. Jones*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Pensarn shore, *Thomas*. Abergele. Between Foryd and Pensarn. By Abergele Station. Llanddulas. Near Ruthin. By Derwen Hall. Near Cotton Hall, Denbigh. Llanrhaiadr. Llanrhaiadr-yn-Mochnant. Pen-y-bont. Gresford. Rossett. Denbigh.

M. rotundifolia L. Llansilin, 1867, *Hb. Jones*. Common around Llandudno, *Inchbald*. Great Orme, *Hodge*. Waste places in Old Colwyn neighbourhood, *Ogle*. Hedgebank near Little Orme and Penmaen Rhos, *Russell*. Colwyn Bay, *ibid*. By some cottages nearly a mile north of Llanbedr Rectory, towards Llangynhafal, 1910.

**Linum angustifolium* Huds. Near a farmhouse, Llandrillo-yn-Rhos, *Russell*.

**L. usitatissimum* L. Cefn Rocks, near Abergele, *Thomas*. Pensarn shore, *Miss F. M. & Dr. E. J. Haynes Thomas* sp. A ballast plant, Colwyn Bay, *Russell*. Plentiful on railway embankment near Colwyn Bay Station, 1910. Shingle between Pensarn and Llanddulas, in fair amount, 1910.

Geranium sanguineum L. Llanferres, *Hb. Potts*. Limestone cliff at Colomendy, near Mold, June, 1869 (*W. Whitwell*), *Hb. Whitwell*. Still there, 1910. These records both refer to the same locality, I believe. Cefn Rocks, near Abergele, *Thomas*. In several stations on the limestone in the north-western extremity of the county.

[*G. sylvaticum* L. In the introduction to this paper I instanced this as one of the species which I considered to have been erroneously recorded by Mr. Hancock. Since this was written, Mr. W. Whitwell informs me that he possesses an example which he found in 1866, in a thicket beyond Blaen-y-cwm, Pennant, near Llangynog. This is in Montgomeryshire, but only about four miles from the Denbighshire boundary. As the *ecclesiastical* parish of Llanrhaiadr-yn-Mochnant is only partly in Denbighshire and includes some adjoining Montgomeryshire territory, it seems probable that Mr. Hancock may have been aware of Mr. Whitwell's station, and that he may have had this in mind when including *Geranium sylvaticum* in his list of plants of the parish. There is, of course, a lesser probability that he may have been acquainted with this species in the Denbigh portion of the parish, but as no definite station is mentioned, and in the absence of any other evidence, I cannot regard this as a Denbighshire plant. At the same time, it would appear that I was perhaps too cautious in regard to the accuracy of this particular record of Mr. Hancock's. The absence of *Geranium sylvaticum* from Denbigh and Flint would be somewhat surprising as *Geraniaceæ* are so well represented in the flora of this area. The wood cranesbill is the only

British member of the order which does not appear to have been so far recorded for one or other of these counties. Although I believe it is absent from Anglesey and Carnarvon, I strongly suspect that it may yet be found in Denbigh.]

G. pratense L. Trefnant, *Russell*. Roadside east of Llanarmon. Plentiful in several fields near the Stag Inn, Llanarmon.

G. pyrenaicum Burm. fil. Near Llangollen, 1872, *Hb. Harris*. Road near quarry, Denbigh, *Fl. B.* Glyn Ceiriog, 1900, *Payne*. Roadside near limestone quarry, Pabo, *Russell*. Mochdre, *ibid.* By the entrance to Nantglyn churchyard. Along the road just outside Nantglyn, towards the Denbigh road. Roadside between Rossett and Marford.

G. dissectum L. Llansilin, 1867, *Hb. Jones*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Legacy, *Thomas*. Eirias Valley, near the sea, *Russell*. Llanddulas. Llanrwst neighbourhood. A few plants between Bylchau Church and Denbigh. Roadside west of Llansannan. Close to Pont Ystrad, towards Denbigh. Near Llanrhaiadr-yn-Mochnant. Railway siding at Llanrhaiadr-yn-Mochnant Station.

G. columbinum L. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Near Coed Coch, near Llanelian-yn-Rhos, *Ogle*. Limestone rocks on Little Orme, *Russell*. Moorland towards Mochdre, *ibid*. Below the limestone rocks south of Llysfaen, 1910. A few plants seen in the field below Nant bach, near Cyffylliog.

G. lucidum L. Llanferres, *Hb. Potts*. Still there. Pont-y-mwynwr, Llanferres, *ibid.* Great Orme, *Osw. F. C.* Llansilin, 1867, *Hb. Jones*. Llanrhaiadr-yn-Mochnant neighbourhood, *Osw. F. C.* Llandegla, *J. M. H. & W. H.* On limestone on Little Orme and Bryn Euryn, *Russell*. On slate near Eglwys Fach, *ibid.* Between Pistyll Rhaiadr and Llanrhaiadr-yn-Mochnant, *Loftus & A. A. D.* Llysfaen. Among shingle on beach between Llanddulas and Pensarn. Below the limestone rocks south of Llysfaen. About Denbigh. Near Henllan. Bank and wall by Graig lwyd, east of Denbigh Waterworks. Llanarmon. About Llangollen. Limestone rocks east of Pant-y-ffordd, north of Llandegla.

G. Robertianum L. *β *purpureum* Forst. On shingle between Pensarn and Llanddulas.

Erodium cicutarium L'Hérit. Llandudno, *Price*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Pensarn shore, *Thomas*. Common and very luxuriant on seashore, Colwyn Bay; and inland on limestone banks especially, *Russell*. Between Llanddulas and Llysfaen, *Hb. W.* (= var. *pimpinellifolium* Cav.). On limestone about Llysfaen, at 450 ft.

**E. moschatum* L'Hérit. Gresford (*Mr. Bowman*), *Hb. Potts*.

E. maritimum L'Hérit. Near Llandudno, *Russell*. Banks above entrance to Marine Drive, Llandudno, *Hodge*. Limestone cliffs facing Llandrillo-yn-Rhos and Gloddaeth, *Russell*.

**Impatiens Noli-tangere* L. Wooded banks of Dee at Chirk and Erbistock.

**I. glandulifera* Roxb. A single plant by the Conway, between Llanrwst and Bettws-y-Coed, June, 1910. Doubtless carried down the river from some habitation or garden higher up. Several plants by old mill-race near the old brickworks by "Lady Bagot's Drive," not far from Rhewl, 1910. Naturalized in quantity and growing in great luxuriance on the right bank of the Afon Clywedog, two miles from Ruthin, between the two bridges close to Rhewl, September, 1910. There are two colour forms here, with pink and white flowers respectively.

Euonymus europæus L. On the limestone rocks south of Llysfaen, 1910, *Thomas & A. A. D.* Llanelian Lane, *Russell.* In the woodland skirting the road by Taldrach, near Bylchau, south-west of Denbigh. Near Henllan. Coed Coppi and Crest-mawr, near Denbigh. Hedges between Henllan and Denbigh. In the wood by the Elwy, north of Pont-yr-allt-goch. Craig Wood, Denbigh. One bush in a hedge on the north side of the road near Rhewl. A single shrub in the hedgerow about a quarter of a mile below Clawdd Newydd, towards Derwen Hall. Bank by roadside about five and a half miles from Ruthin, and again a little further on, and before coming to the eleventh milestone from Wrexham. Gresford Wood—two or three shrubs by the footpath, not far from the "Roft." Recorded in *Top. Bot.* as not a native in Denbighshire. This is sometimes the case, but the Spindle-tree is clearly indigenous in several stations on limestone.

Rhamnus catharticus L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Hedges near St. George, *Russell.* Mr. Hodge tells me that he received examples from Mr. Harnaman, from Llandegla, in 1909. Copse on limestone rocks above and east of Pant-y-ffordd, north of Llandegla, 1910. Wood at the highest point of the limestone, north-west of Ruthin, 1910.

Acer campestre L. Llansilin, *Hb. Jones.* Llangollen, 1871, *Hb. Harris.* Burton, near Rossett, *Thomas.* Bank of lane west of Coed Oerllwyn, Llanynys. Two trees between Clocaenog and Ruthin. One shrub in hedge about one and a half miles from Ruthin, towards Pont uchel. Hedges south of Ruthin, near Coed Marchion. One small tree in a shady lane between Derwen and Ffynnon Sarah. Hedge by bridge over river a short distance north-east of Llanrhaiadr Station, 1910. Between Tyn-lôn and Pont Ryffudd, near Bodfari, 1909. By the stream in the path from Ruthin to Llanbedr, close to the foot-bridge. Copse on limestone rocks above and east of Pant-y-ffordd, north of Llandegla. Roadside south of Llanarmon. Along the road south of a farm called Merllyn, a mile or so from Llanrhaiadr. In the Nant by Bryn isaf, below Moel Llech, at 800 ft. Llanrhaiadr-yn-Mochnant, Llansilin, and Llangedwyn. Marford. Gresford. Rossett.

Genista tinctoria L. By Llysfaen Station, 1863, *Price.* Still there in abundance. Mynydd-y-bryn, near Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* On ironworks ash-heaps at Acrefair, *T. Ruddy.* Llandrillo-yn-Rhos Marsh, *Russell.*

Ulex Gallii Planch. Common in the hill districts.

Cytisus scoparius Link. Llandudno, *Price.* Llansilin, 1867, *Hb. Jones.* High ground above the tunnel between Llysfaen and

Old Colwyn, *Ogle*. Slate hills inland of Colwyn Bay, *Russell*. Occasionally by the Conway between Bettws-y-Coed and Llanrwst. Near Llansannan. A few examples between Ruthin and Cyffylliog. Between Clocaenog and Clawdd Newydd. Plentiful on the south side of Moel Llech, at about 1150 ft. By the Tanat.

Ononis repens L. Llansilin, 1867, *Hb. Jones*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. High ground above the tunnel between Llysfaen and Old Colwyn, *Ogle*. Colwyn Bay shore, *Russell*. Banks along Marine Drive, Great Orme, *Hodge*.—Var. *horrida* Lange. Sandy beach between Llanddulas and Llysfaen, *Hb. W*. Along the shore between Llanddulas and Pensarn.

O. spinosa L. Pensarn shore, *Thomas*. Shore between Llysfaen and Pensarn.

**Trigonella ornithopodioides* DC. Gravelly field near Colwyn, May 27th, 1893, *Hb. W*.

**Medicago sativa* L. Railway embankment and shore, Colwyn Bay, *Russell*. Llansilin, 1870, and Llangollen, *Hb. Jones*. Llandudno. Railway embankment near Llanrwst. Railway banks between Ruthin and Denbigh.

**M. falcata* L. In one place on the Great Orme, 1909, *Hodge*.

M. arabica Huds. Little Orme, and also on banks along the Marine Drive, Great Orme, 1909, *Hodge*. Roadside, Glascoed, near St. Asaph, 1910, *Hodge*. Given as a doubtful Denbigh plant in *Top. Bot.*

**Melilotus altissima* Thuill. Old Colwyn neighbourhood, *Ogle*.

**M. alba* Desf. Elevated ground above the tunnel between Llysfaen and Old Colwyn, *Ogle*. Roadside, Colwyn Road, near Colwyn Bay, and also in railway-cutting at Colwyn Bay, *Russell*.

**M. officinalis* Lam. Clover-field, Llansilin, 1871, *Hb. Jones*.

Trifolium medium L. Mynydd-y-bryn, Llansilin, 1867, *Hb. Jones*. Lane near Colwyn Bay, *Hb. W*. Near Little Orme, *Russell*. Llandegla, *Hodge*. Roadside between Llanrhaiadr and the Denbigh Asylum. Great Orme.

T. arvense L. Pensarn shore, *Thomas*. Colwyn Bay, *Drinkwater*. Sandy fields, Llandudno, *Hodge*.

T. striatum L. Plentiful on shore by the entrance to Gwrych Castle, 1910, *Thomas* sp. Sandhills near Deganwy, *Inchbald*. Rhos Marsh, *Russell*. Great Orme.

T. scabrum L. Given in *Top. Bot.* as needing verification as a Denbigh plant. Denbigh green, *Hb. Potts*. This would probably be somewhere about 1834. Rhos Marsh, in company with *T. striatum*, *Russell*.

**T. hybridum* L. Llandegla, *Hodge*. Seashore, Colwyn Bay, *Russell*. Erbistock.

T. fragiferum L. Salt marsh, Llandrillo-yn-Rhos, *Russell*.

Anthyllis Vulneraria L. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Pensarn shore, *Thomas*. Pabo Hill and Bryn Euryn, *Hb. W*. Llandegla, *J. M. H. & W. H.* Colwyn Bay neighbourhood, *Russell*. Banks by Llysfaen Station. Llanddulas. Llysfaen. Between Pensarn and Llanddulas. The Leet.

Ornithopus perpusillus L. Llansilin, 1867, *Hb. Jones*. Sandy field, Old Colwyn Hillside, *Russell.* Margins of road above Meifod farm, between Cyffylliog and Nantglyn, at 1050 ft.

Hippocrepis comosa L. On ledges of the upper rocks above the church, Llandudno, *Inchbald.* Great Orme, 1909, *Hodge.*

**Onobrychis viciæfolia* Scop. Denbigh, August, 1834, *Hb. Potts.*

Vicia hirsuta Gray. Rossett, *Thomas.* With other casuals on waste ground at Glyn Ceiriog Station, 1900, *Payne.* By the railway east of Foryd Station, 1910. Shingle on shore between Gwrych and Llanddulas. Railway embankment between Llanrwst and Bettws-y-Coed. Roadside between Bachymbyd bach and Pont uchel. Several plants by roadside about a third of a mile above Derwen Station, towards the village, 1910.

V. tetrasperma Moench. A ballast plant at Colwyn Bay, *Russell.* By roadside south-east of Pont Ystrad. Roadside between Bachymbyd bach and Pont uchel, 1910. Several plants on roadside bank near Tyddyn-y-calchwr, between Ruthin and Cyffylliog. Between Llandyrnog and Bodfari, 1909. Bank by roadside south of Llanrhaiadr-yn-Mochnant Station.

V. Orobus DC. Cernioge, July, 1838, *Hb. Potts.* Sparingly in two places by the Conway.

V. sylvatica L. Copse near Pont-yr-allt-goch, *Fl. B.* Plentiful on banks about Llysfaen Station.

V. angustifolia L. Llansilin, 1868, *Hb. Jones.*

**V. lathyroides* L. Orme's Head, *Payne.*

Lathyrus sylvestris L. Deganwy, *Inchbald.* In some quantity on a grassy bank above and to the right of the road, ascending the hill from Ruthin towards Pont uchel, August, 1910.

Prunus institia L. Hedges at Moelfre, near Llansilin, 1871, *Hb. Jones.* Near Llansannan. Cyffylliog. Near Fotty bach, between Diffwys and Cyffylliog.

**P. domestica* L. Llanferres, *Hb. Potts.* Llansilin, 1871, *Hb. Jones.*

P. Padus L. Llangedwyn, 1867, *Hb. Jones.* Llanferres, *Hb. Potts.* Pont-y-mwynwr, Llanferres, *Hb. Potts.* Between Tanllwyn and the River Tanat, *T. W. Hancock.* Near the Sanatorium, Llanarmon, *Hodge.* Thicket on right of road going from Ffrith towards Cefn-y-Bedd, not far from the former place, 1910, *Thomas & A. A. D.* Hedgerow close to a farm called Finger, on the Llansannan Road. Pont Deunant. By the stream north of Llyn Creiniog. By the road between Llyn Creiniog and Llansannan. Plentiful in hedgerows between Clawdd Newydd and Ffynnon Sarah. Hedges outside Llanfihangel Glyn Myfyr, towards Cerrig-y-Druidion. Hedge by a cottage, where a stream crosses the road north of Llanbedr School. In the woodland by Pistyll Rhaiadr, at about 1100 ft. Between Pistyll Rhaiadr and Llanrhaiadr-yn-Mochnant.

**Spiræa salicifolia* L. On boggy ground north-east of Pentre Foelas, by the road before reaching Llyn Alwen. Hedge at right angles to road below Bryn hyfryd, near Pont Petrual, one mile south of the source of the Clwyd, 1910. Extending for about a hundred yards along a bank, three-quarters of a mile or so from Llanfihangel Glyn Myfyr, towards Cerrig-y-Druidion. Hedge by road, about a quarter of a mile east of Cerrig-y-Druidion. Forming several hedges on the bogland between Cerrig-y-Druidion and Cernioge. Plentiful on roadside between Clawdd Newydd and Clocaenog.

*S. *Filipendula* L. Llandudno Warren, *Price.* Pabo village, and moorland near Mochdre, 1900, *Hb. W.*

Rubus idæus L. Frequent.

**R. rhamnifolius* Wh. & N. Courtwood, near Wrexham, *Hb. Potts.*

R. pulcherrimus Neum. Near Colwyn Bay, 1895 (*Painter*), *Hb. W.*

R. rusticanus Merc. Frequent.

R. macrophyllus Wh. & N. Near Colwyn Bay, 1895 (*Painter*), *Hb. W.* (= var. **Schlechtendalii* Wh. & N.). Bank near Moelfre, 1872, *Hb. Jones* (= *R. umbrosus* Bab. fide *Boswell*).

R. cæsius L. Frequent.

R. saxatilis L. Glan-yr-afon Wood [near Llanferres], *Hb. Potts.*

**R. Chamæmorus* L. Craig Berwyn, 1867, *Hb. Jones.* On the Berwyn and the Mynydd Tarw, *Hancock.*

Geum rivale L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Pistyll Rhaiadr, 1866, *Hb. Jones.* Still there, 1910, *A. A. D.* Elwy valley, *Russell.* Nant-y-garth. Laneside south-east of Gelli gynan, near Llanarmon.

G. rivale L. × *G. urbanum* L. (*G. intermedium*). Wilderness near Wrexham, 1910, *Drinkwater.*

**Potentilla norvegica* L. Waste ground at Glyn Ceiriog Station, 1900, *Payne.*

P. verna L. Bryn Euryn and Little Orme, *Russell.*

P. palustris Scop. Moelfre Pool, 1867, *Hb. Jones.* Still there. Llyn-y-Fawnog, *Russell.* Abundant in the marshy ground about Llyn Creiniog, above Llansannan. About Llyn-y-Cwrt, in quantity. Swamp by Pont Petrual, south-west of Clocaenog. Abundant about the swampy margins of Llyn Gweryd.

Poterium Sanguisorba L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llandegla, *Hodge.* Bryn Euryn and the Orme's Heads. Llanarmon. The Leet.

**P. officinale* A. Gray. Marshy field by Llandegla, 1909, *J. M. H. & W. H.*

Rosa spinosissima L. Frequent along the coast, and occurs inland on limestone. Llandegla. Llanarmon. Near Gelligynan.

**R. involuta* Sm. var. *Sabini* Woods. "A very fine example in wood near Llanelian. Identified by Mr. Baker," *Russell.*

**R. mollis* Sm. Moorlands above Colwyn Bay, *Hb. W.* Field hedge near Llanarmon, *Hodge.*

R. tomentosa Sm. Frequent.

**R. Eglanteria* Huds. Queried in *Top. Bot.* In the field above the Ferry House at Erbistock.

R. micrantha Sm. Near Golfa, Llangedwyn, 1872 (fide *Boswell*), *Hb. Jones.*

**Pyrus communis* L. Several trees in a strip of woodland skirting the road, two miles west of Rhuddlan Station, towards Abergele, 1910.

**Cratægus oxyacanthoides* Thuill. Llansilin, 1867, *Hb. Jones.*

**C. Pyracantha* Pers. A bush on the bank on the north side of the road ascending the hill from Ruthin towards Pont uchel, 1910. Growing in company with *Lathyrus sylvestris* and *Daphne Laureola.*

Saxifraga stellaris L. Moelfre uchaf, in company with *Lycopodium alpinum*, *Russell.*

S. tridactylites L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Castell Dinas Brân, Llangollen, 1871, *Hb. Harris.* Still there. Great Orme's Head, *Rev. W. W. How.* Plas Newydd farm, Llanarmon, and Eyarth Woods, near Ruthin, *J. M. H. & W. H.* Common on walls near the sea, Colwyn Bay, and also occurs inland, *Russell.* Llandudno. Limestone walls, Ruthin. Wall in front of Derwen Hall. Limestone wall by roadside, about two and a half miles from Ruthin, towards Clawdd Newydd. Low wall by roadside, Nant-y-Garth. Llanarmon. Walls by Pen dyffryn, south-east of Llanrhydd, at 400 ft. Limestone rocks east of Pont-y-ffordd, above Llandegla. Llangollen district.

S. granulata L. Erbistock, *Loftus & Marsh.*

S. hypnoides L. Pistyll Rhaiadr, 1863, *Hb. Jones.* Still there, 1910.

Chrysosplenium alternifolium L. Llansilin, 1867, *Hb. Jones.* Bank of Elwy, near Pont-yr-allt-goch, *Fl. B.* Moist banks by the roadside and streamlet, south-east of Glascoed Hall, between Nant-y-ffrith and Brymbo, 1910, *Thomas & A. A. D.* By the Mill, Llandegla, *J. M. H. & W. H.* Nant-y-Garth.

Ribes alpinum L. Llanferres, 1835, *Hb. Potts.* One bush in hedge by road between Pont Deunant and a farm called Finger. Several examples on a bank on south side of road between Bylchau Church and Hafod-ifan. Hedges between Llanbedr School and Hirwaen. Hedgerow near a farm on the road south-east of Llyn Moelfre, 1910.

**R. rubrum* L. Near the river, Llansilin, 1867, *Hb. Jones.* By the mill by the Clwyd, east of Derwen Station, 1910. By the Cynllaith, near Pont Sycharth, 1910.

**R. nigrum* L. A bush by the River Tanat, below Glan Tanat-isaf. By the Alyn between Marford and Rossett.

Cotyledon Umbilicus-Veneris L. Llansilin, 1867, *Hb. Jones.* Hills on Denbigh side of Clwyd Valley, *Fl. B.* Rocks and walls near Tal-y-Cafn. Rocks by railway near Glan Conway Station. North-east of Llanrwst. Wall opposite the letter-box at Pentre tafarn-y-fedw. Rocks above Diffwys, west of Cyffylliog, at 1100 ft. In several places about Pont uchel. Rocks by "Lady Bagot's Drive," between Pont uchel and Rhewl. East of Llanfihangel Glyn Myfyr. Bend of road above Derwen Station. Between Clawdd Newydd and Derwen Hall. Tanat Valley. Between Llanrhaiadr-yn-Mochnant and Pistyll Rhaiadr. Rocks by Pistyll Rhaiadr.

Sedum Telephium L. Glyn Ceiriog, 1900, *Payne.* In an old quarry between Tal-y-Cafn and Eglwys Fach, *Thomas.* Little Orme, *Russell.* Rocky places about Llandegla, *J. M. H. & W. H.*

Plentiful at Pont uchel. Rocks by "Lady Bagot's Drive," between Rhewl and Pont uchel. Rocks by waterfalls above Diffwys, west of Cyffylliog, at 1200 ft. On damp rocks, Pistyll Rhaiadr, at about 1200 ft. By the roadside, above a farm called Cefn hirfawr, near Llanarmon Mynydd Mawr. Rocky side of lane above Tre-wern, near Llanrhaiadr-yn-Mochnant.

*S. *purpureum* Tausch (= *S. Fabaria* Koch). Llansilin, *Hb. Jones*. On a wall by the church at Llanfihangel Glyn Myfyr.

*S. *album* L. Pensarn shore, *Thomas*. Wall, Coed Coch, *Russell*. On a cottage wall, Moelfre, *Loftus*. Among shingle on shore, close to a house about three-quarters of a mile east of Llanddulas Station.

*S. *dasyphyllum* L. On rocks in disused portion of the limestone quarry, a mile north-west of Ruthin. Also occurs on a wall skirting the road near by. Farmyard wall and bank by roadside by first house on the north side of the road above the Bridge Inn, Pont uchel, towards Ruthin, 1910.

S. anglicum Huds. Pensarn shore, *Thomas* sp. Slate-rocks above Mochdre, *Russell*. Great Orme, *Hodge*. Walls near Bettws-y-Coed. On rocks by the mountain road over Foel uchaf, from Cyffylliog towards Denbigh. Bank by Careg-y-gath, north of Cyffylliog. Rocks by waterfalls above Diffwys, extending to 1250 ft. Rocks and walls east of Llanfihangel Glyn Myfyr. Rocks by the River Alwen at Llanfihangel Glyn Myfyr. A few plants seen near Cerrig-y-Druidion. Sparingly on a wall between Cerrig-y-Druidion and Cernioge. On rocks in small amount at one point by "Lady Bagot's Drive." Close to the "Green Inn," Llangedwyn. Between Llanrhaiadr-yn-Mochnant and Pistyll Rhaiadr. Rocks and roof of outhouse by Tan-y-pistyll, Pistyll Rhaiadr. Ascends to 1500 ft. on rocks west of Pistyll Rhaiadr. Among shingle by the Tanat.

*S. *reflexum* L. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Plas newydd, Llansilin, 1869, *Hb. Jones*. Pont-y-Ddol, *Fl. B.* Wall near Abergele, *Thomas*. On an old wall, Coed Coch, *Russell*. Walls by roadside near Denbigh Castle (= β *albescens* Haw). Wall, Tre-wern, east of Llanrhaiadr-yn-Mochnant.

*S. *rupestre* L. Roadside leading to Gwernllyfnant, near Llansilin, 1867, *Hb. Jones*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Pensarn shore, 1910, *Thomas* sp.

S. Fosterianum Sm. Little Orme, *Inchbald*. Damp rocks, Pistyll Rhaiadr, 1910.

**Sempervivum tectorum* L. Near Coed Coch, *Russell*. Roof of pigstye between Llangynhafal and Llanbedr. Near Pont uchel. Near the church at Llanfihangel Glyn Myfyr.

Drosera rotundifolia L. Nant-y-glyn, near Colwyn Bay, *Russell*. Swampy ground about Llyn-y-Cwrt. Bog between Cerrig-y-Druidion and Glasfryn. Swamp south of Pincyn Llus, Cyffylliog.

Myriophyllum spicatum L. Above the woods, Colwyn Bay, *Russell*. Llyn Gweryd. In a small pond near the Conway, between Llanrwst and Bettws-y-Coed.

**M. alterniflorum* DC. In the Conway near Llanrwst. Plentiful in the Clwyd about Pont Petrual. In the mill-race by the Afon Corres, near Cyffylliog.

**Callitriche stagnalis* Scop. Moelfre Pool, near Llansilin, 1876, *Hb. Jones.*

**C. intermedia* Hoffm. Mill stream at Rhydleos, Llansilin, 1874 (fide *J. G. Baker*), *Hb. Jones.*

Lythrum Salicaria L. Ditch, Llandrillo Valley, *Russell.* By the Clwyd between Ruthin and Denbigh, and also lower down the river. Ditches by railway about Llanrhaiadr. A plant or two seen by the River Tanat, south-west of Pentre Felin.

Epilobium angustifolium L. In quantity by the Five Fords between Cefn and Marchwiel, *Mrs. Evans Jones.* Marchwiel Station. A weed in garden of a farm called Fotty bach, west of Cyffylliog. On the hillside, two or three hundred yards due north of the roadside spring, Nant-y-Garth. Plantation by a cottage by road south of Llyn Gweryd, at 920 ft. In 1910 there was a large patch of some eighty yards in diameter at the south-west end of Llyn Gweryd. I have never before seen this plant in such profusion. It was growing in an immense patch to the entire exclusion of anything else, and the brilliant mass of colour made a wonderful and impressive sight, which was visible from afar.

E. parviflorum Schreb. Mochdre and Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Railway cutting, Colwyn Bay, *Russell.* Great Orme, *Hb. W.* Wernllyfynt, 1867, *Hb. Jones.* Between Chirk Fish Hatcheries and Chirk village, *Hb. W.* Near Llanynys. Laneside below Pen dyffryn, near Llanrhydd. By the Tanat.

E. tetragonum Curt. Nant-y-glyn, near Colwyn Bay, *Russell.*

E. obscurum Schreb. Llansilin, 1872 (fide *Boswell*), *Hb. Jones.*

E. palustre L. Moelfre Pool, 1867, *Hb. Jones.* Still there. Llyn-y-Fawnog; Nant-y-glyn, near Colwyn Bay, *Russell.* Above Diffwys, west of Cyffylliog, at 1050 ft. Pincyn Llus. Bog between Cerrig-y-Druidion and Glasfryn.

Bryonia dioica Jacq. Hedges about Rossett, Gresford, and Marford. Erbistock. Hedges between the "Roft" and the river at Marford.

Eryngium maritimum L. Colwyn Bay district, 1862, *Price.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Pensarn shore, *Thomas.* West side of Great Orme, *Hodge.* Shingle between Abergele and Llanddulas.

Conium maculatum L. Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Cefn Rocks, near Abergele, *Thomas.* Bryn Euryn, *Russell.* Llandudno. Roadside about one and a half miles from Abergele, towards Rhuddlan. Very luxuriant in a disused corner of the limestone quarry north-west of Ruthin. Near Cotton Hall, Whitchurch. On rubbish in lane east of road, a little below Derwen Hall. Near Moelfre. Below Maes-y-bwch, near Llanrhaiadr-yn-Mochnant. About the old mill, Moelfre. By Oddiar-y-llyn, south-west of Llyn Moelfre. Close to Glan Tanat-isaf.

Smyrnium Olusatrum L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Deganwy, *Price.* Pensarn shore, *Thomas.* Little Orme, *Hodge.* Glyn Ceiriog, *Payne.* A small clump by railway, a little distance from Foryd Station, towards Abergele. Plentiful by roadside about one and a half miles from Abergele, towards Rhuddlan.

Apium graveolens L. Ditches near Abergele. Near Llandudno.

A. nodiflorum Reichb. fil. **β ochreatum* DC. Spring on Great Orme, 1907, *Hb. W.*

A. inundatum Reichb. fil. Briew Pool, *Miss E. F. Jones.* Llanyfydd, 1904, *Russell.* Margin of Llyn Gweryd.

**Carum Petroselinum* Benth. & Hook. Bryn Euryn, *Price.* Old Colwyn, *Russell.* Wall-top near Bryn Euryn, 1900, *Hb. W.*

Sison Amomum L. Near Deganwy and roadside between Llandrillo-yn-Rhos and Llangwstenin, *Russell.* Between Pont Ryffudd and Trefnant. By Pont-yr-allt-goch.

Sium erectum Huds. Llangedwyn, 1867, *Hb. Jones.* Pensarn brickfields, *Thomas.*

Myrrhis Odorata Scop. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Glyn Ceiriog, 1900, *Payne.* Field edges, Chirk Fish Hatcheries, 1909 (*Miss Hughes*), *Hb. W.* Near the mill, Pont-y-ddol, by Elwy, near Llanfair Talhaiarn, *Russell.* Frequent about the roadside near the mill, Llandegla, *J. M. H. & W. H.* Near Oddiar-y-llyn, south-west of Llyn Moelfre, *Loftus & A. A. D.* In fair quantity by the Clywedog at Pont uchel. Bank of stream just beyond Llanrhaiadr Station. Laneside and skirting a field between Merllyn and Fachlwyd uchaf, above Cyffylliog. By the river by "Lady Bagot's Drive," between Rhewl and Pont uchel. On two islets in the Clywedog, between Cyffylliog and Melin-y-moch. By the roadside close to Dafarn dwyrch, between Ruthin and Llangollen. By Pant-y-ffordd, north of Llandegla, in company with *Campanula latifolia* and *Petasites vulgaris.* Gresford.

Scandix Pecten-Veneris L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llandudno, *Price.* Pensarn shore, and also on the road and in a field by the County School, Abergele, *Thomas.* Railway embankment, Colwyn Bay, *Russell.*

Anthriscus vulgaris Bernh. Llansilin, *Hb. Jones.* Banks near the sea at Llandrillo-yn-Rhos, *Russell.* Deganwy.

**Fœniculum vulgare* Mill. Pensarn shore, *Thomas.* Frequent in Llandudno neighbourhood.

**Crithmum maritimum* L. Little Orme, *Price.* Still there. Great Orme, *Hodge.*

Œnanthe Lachenalii C. Gmel. Along a salt-water ditch, Llandrillo-yn-Rhos, *Russell.* Ditches, Morfa Rhuddlan.

Æthusa Cynapium L. Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Nant-y-glyn, Colwyn Bay, *Russell.* Llandegla, *J. M. H. & W. H.* Foryd.

Silaus flavescens Bernh. Roadside near Llanfair Talhaiarn, *Russell.* Roadsides about Trefnant. A few plants by roadside south of Coed Coppi, about one mile from Denbigh.

**Peucedanum sativum* Benth. & Hook. fil. Pensarn meadows, *Thomas.*

Daucus Carota L. Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Old Colwyn, very common, *Ogle.* Pensarn shore, *Thomas.* Colwyn Bay, *Russell.* Common on the Great Orme, *Hodge.* Wrexham, *Drinkwater.* Abergele. Pensarn to Llanddulas. Roadside north-east of Llanrwst. Laneside by Pen dyffryn, south-east of Llanrhydd, at 400 ft. Near Moelfre. Marford.

**Caucalis daucoides* L. Has occurred on ballast at Colwyn Bay, *Russell.*

C. nodosa Scop. Ruins of Deganwy Castle, *Inchbald.* Field between the shore and the railway near Pensarn, *Thomas* sp. Near the railway at Old Colwyn, *Ogle.* Frequent on the Great Orme, *Hodge.* Llysfaen.

Cornus sanguinea L. Cefn, *Fl. B.* Minera, *Thomas.* Wood by the Elwy, north of Pont-yr-allt-goch, *Day.* Near Llansilin, *Loftus & A.D.D.* Henllan. Hedges between Henllan and Denbigh. About Denbigh. Between Ruthin and Clocaenog. Roadside hedges between Ruthin Church and Pont uchel, extending for about a mile from the former place. Hedgerow near Graig lwyd, east of the Denbigh Waterworks. Several examples in the hedgerow about a quarter of a mile below Clawdd Newydd, towards Derwen Hall. Plentiful by the roadside south of Ruthin. Near Llanarmon Mynydd Mawr. Hedgerow between Llanrhaiadr-yn-Mochnant and the station. The "Roft" and neighbourhood. Erbistock. Gresford Wood.

**C. alba* L. In a hedgerow at Llanfihangel Glyn Myfyr.

Sambucus Ebulus L. About a mile above Glyn Ceiriog, 1860, *Osw. F. C.* Roadside close to a farm east of Foel Greon, on the road to Llansannan, not far from the Nant glyn road, 1910. A large clump in a field by the roadside, a mile south-west of Nant glyn, 1910. This latter station is just past a wood which skirts the roadside, close to a walled-in gateway, and directly opposite a farm called Blaenau.

Viburnum Opulus L. In the hedge half a mile from Legacy Station, *Thomas.* Rossett and Burton, *Thomas.* A few examples seen by the Conway between Bettws-y-Coed and Llanrwst, near the former place. Between Trefnant and Pont Ryffudd. Hedge on north side of road between Bylchau and Denbigh. South of Pengwern, between Llansannan and Henllan. In a hedge by the road below Derwen Hall. Between Clocaenog and Ruthin. Between Llanynys and Rhewl. Woodland by "Lady Bagot's Drive," between Rhewl and Pont uchel. By the Alyn, Pant-y-ffordd, north of Llandegla. By roadside about twelve miles or so from Wrexham, towards Ruthin. Lane south-east of Gelli-gynan, Llanarmon. Near Llanrhaiadr-yn-Mochnant. Hedgerow between Pistyll Rhaiadr and Llanrhaiadr-yn-Mochnant.

**Lonicera Xylosteum* L. Grows outside Llansannan, *Fl. B.* I have seen no specimens.

Rubia peregrina L. Appears to attain at Llandudno its northern limit in our island, *Inchbald.* Gloddaeth, *Price.* In the wood above the weir on left bank of the Elwy, higher up than

St. Mary's Well [Ffynnon Fair], *Fl. B.* Among loose stones on Bryn Euryn, in company with *Thalictrum minus*, *Russell.*

**Galium boreale* L. Moist rocks, Great Orme, 1910, *Drinkwater.* This is also said to occur at Gresford, but this latter record rests only on very dubious authority.

G. verum L. Llandrillo-yn-Rhos, *Hb. Harris.* Pensarn shore, *Thomas.* Llysfaen, *Russell.* Llandudno. Abergele. Lane by Pant-y-cefn, west of Nant-y-Fleiddiart, at 1100 ft. Between Cerrig-y-Druidion and Ruthin. Llanferres. By roadside east of Pont uchel, towards Ruthin. Near Llangollen. South of Llanarmon. The "Roft," Marford. — Var. **maritimum* DC. Sandy coast, Llanddulas and Llysfaen, *Hb. Waterfall.*

**G. Mollugo* L. Llangwstenin Valley and near Colwyn Bay Station, *Russell.* Chirk Fish Hatcheries, *Hb. Waterfall.*

G. palustre L. Llansilin and Moelfre Pool, 1867, *Hb. Jones.* Nant-y-glyn, *Russell.* Near Abergele. Conway Valley. Near Llansannan. Above Cyffylliog. Between Cerrig-y-Druidion and Pentre Foelas. Between Llewesog and Cyffylliog. Llyn Gweryd. —Var. **Witheringii* Sm. Gresford, *Hb. Potts.*

Asperula odorata L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Between Ruthin and Llangollen, 1860, *Hb. Harris.* Still there. Hedgebank between St. Asaph and Cefn, Denbighshire, 1873, *Hb. Brown.* Gloddaeth, *Price.* Minera, *Thomas.* Coed Coch, near Llanelian-yn-Rhos, *Ogle.* Nant-y-ffrith, *Thomas.* Wood near Llanrwst, towards Pentre tafarn-y-fedw. Henllan. Near Denbigh. Gresford. Nant-y-Fleiddiart. Plentiful near Ruthin, towards Cyffylliog. Wood near Nantglyn. Llangollen. Nant-y-garth. Between Llanrhaiadr-yn-Mochnant and Pistyll Rhaiadr. Erbistock. Marford.

Sherardia arvensis L. Llansilin, 1867, *Hb. Jones.* Llandudno, *Price.* Glyn Ceiriog, *Payne.* Minera, *Thomas.* Colwyn Bay neighbourhood, *Russell.* Great Orme, *Hodge.* Llandegla, *J. M. H. & W. H.* Llanddulas. Llysfaen. Llanarmon. Near the "Loggerheads." Llanrhaiadr-yn-Mochnant. Gresford.

Valeriana dioica L. Conway Valley. Marshy ground by stream near Cefn-y-bedd.

**Kentranthus ruber* DC. Great Orme, *Russell.* Llandudno, *Price.* Railway banks between Colwyn Bay and Mochdre. About the church and ferry house at Erbistock.

Valerianella olitoria Poll. Llandudno, *Price.* Llansilin, 1867, *Hb. Jones.* Near the Rossett, May, 1869, *Hb. Harris.* Pensarn shore, *Thomas.* On walls near Llandrillo-yn-Rhos, *Russell.* Marford.

V. carinata Lois. Wrexham, *Hb. Harris.*

**V. rimosa* Bast. Gresford, *Hb. Potts.*

V. dentata DC. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Llansilin, 1867, *Hb. Jones.* Cornfield, Nant-y-glyn hillside, *Russell.* Llandegla and Llanarmon. Cornfield near Clawdd Newydd. Several plants on roadside near Capel Saron, near Nantglyn.

Dipsacus sylvestris Huds. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Left bank of Elwy near St. Mary's Well [Ffynnon Fair], *Fl. B.*

Pensarn shore and brickfields, *Thomas*. Common on limestone rocks near Llangollen, *T. Ruddy*. Trevor, *Drinkwater*. Bryn Euryn, *Russell*. Near Llandudno.

D. pilosus L. Chirk, *W. Whitwell*. Glascoed Dingle, Llansilin, *Hb. Jones*.

Scabiosa Columbaria L. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Limestone cliff at Colomendy, near Mold, 1869 (*W. Whitwell*), *Hb. Whitwell*. Still there. Not unfrequent on the headland, Llandudno, *Inchbald*. Little Orme and Llandegla, *Hodge*. Llysfaen.

Eupatorium cannabinum L. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Rossett Weir, *Thomas*. Very luxuriant in a damp spot on the embankment between the railway and the shore at Llysfaen, *Ogle*. Great Orme, *Hodge*. Railway embankment Colwyn Bay, *Russell*. By the Conway between Llanrwst and Bettws-y-Coed. By the Elwy at Pont-yr-allt-goch. Near Pont uchel. Between Pont uchel and Cyffylliog. Close to the bridge over the Clwyd, north of Llanynys. By "Lady Bagot's Drive," between Rhewl and Pont uchel. Gresford. Erbistock.

Solidago Virgaurea L. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Pistyll Rhaiadr, *Hb. Jones*. Glyn Ceiriog, 1867, *Hb. Jones*. Quarry behind Tan-yr-allt, Abergele, *Thomas*. About Llanelian-yn-Rhos, *Ogle*. Wood in Nant-y-glyn, *Russell*. Llansannan. Clocaenog. Cyffylliog. Between Ruthin and Pont uchel. Llanferres.—Var. *β *angustifolia* Gaud. By the Conway below Bettws-y-Coed.

Aster Linosyris Bernh. Formerly occurred in one coast station, but is probably now extinct.

A. Tripolium L. Salt-marshes and muddy banks about the mouth of the Conway and the Clwyd.

Erigeron acre L. Pensarn shore, *Thomas*. Pwll glas and walls round Eyarth Woods, near Ruthin, *J. M. H. & W. H.* Wall, Gwrych Park, Llanddulas, *Russell*. Plentiful on shingle between Pensarn and Llanddulas. Llysfaen. Rhyd-y-foel. Graig quarry, Denbigh. An odd plant by roadside by bridge over the Clwyd, two miles south of Ruthin. Plentiful about the limestone quarry north-west of Ruthin. Rocky places and old lime-kilns by "Lady Bagot's Drive." About twenty plants on top of the wall of the Ruthin Gasworks. No doubt introduced in the last station with stone or lime.

Filago germanica L. Near Moelfre, 1867, *Hb. Jones*. Sandy field, Bryn Euryn, *Russell*.

F. minima Fr. Sand-pit, Old Colwyn, *Russell*.

Antennaria dioica Gaertn. Pont-y-mwynwr, Llanferres, *Hb. Potts*. On the Orme's Head in abundance, *Inchbald*. Bryn Euryn, *Russell*.

Gnaphalium sylvaticum L. Sandy field, Colwyn Bay, *Russell*.

**Inula Helenium* L. A considerable quantity near the junction of the Ceiriog and the Dee, 1863, *Osw. F. C.* Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Neighbourhood of Llanddulas, *Mrs. New*. Field-dyke, Pentre coed, about two miles from Old Colwyn, *Ogle*. Marsh near Llangwstenin Church, 1902, *Russell*. Hilly pastures near Llangollen, *Drinkwater*. Two plants by smithy between Llandyrnog and Bodfari, 1909.

I. squarrosa Bernh. Llanferres, *Hb. Potts*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Llandudno, *Price*. Pensarn shore, *Thomas*. Quite a small forest on the slope by the railway at Llysfaen, *Ogle*. Waste places, Llandudno, *Hodge*. Wood side near Pabo Station, *Russell*. Eyarth Woods, near Ruthin, *J. M. H. & W. H.* Between Chirk Fish Hatcheries and the village, *Hb. Waterfall*. In the woods by the Cefn Caves, near St. Asaph, *Hodge*. Near Llangollen, *Mrs. Fletcher*. Rocks near the "Loggerheads," *Hodge*. Railway-bank, Gresford, *Hodge*. By "Lady Bagot's Drive." Scattered, somewhat sparingly, along the roadside between Ruthin and Llanrhaiadr. Near Caerwys. Nant-y-garth, near Ruthin. A few plants by roadside about a mile from Ruthin, towards Llangollen. Marford.

Pulicaria dysenterica Gray. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Shore bank at Old Colwyn, *Ogle*. Pensarn shore, *Thomas*. Burton, *Thomas*. Little Orme, *Russell*. Near Abergele. Morfa Rhuddlan. Erbistock.

Bidens tripartita L. A patch by a ditch by the road between Llawog farm and the Clwyd, near Llanynys. Near the Tanat, close to Glan Tanat-isaf, seen on both sides of the river.

B. cernua L. Several plants in the *Stratiotes* pond at Gresford; perhaps introduced, *Drinkwater*.

Anthemis Cotula L. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Nant-y-glyn, *Russell*. Near Plas-yn-Ward, near Rhewl.

Chrysanthemum segetum L. Llansilin, 1867, *Hb. Jones*. Hillside, Nant-y-glyn, Colwyn Bay, *Russell*. Fields north-east of Pentre Foelas. Cornfields about Llansannan. East of Foel Greon, between Llansannan and Nantglyn. Field near Clawdd Newydd. Amongst oats in a field opposite the post office at Llanfihangel Glyn Myfyr. Field at Glasfryn. Fields by Llyn-y-Cwrt. Field below Pincyn Llus, towards Cyffylliog.

C. Parthenium Bernh. Llansilin, 1867, *Hb. Jones*. Llandudno, *Price*. Hedge, Nant-y-glyn, Colwyn Bay, *Russell*. About Pont uchel. Lane leading to a farm above the road north of the river, east of Cyffylliog. Roadside about a third of a mile above Derwen Station, towards the village; no doubt originated from adjoining garden. Near Nantglyn. On the hillside above the road and about two or three hundred yards due north of the well, Nant-y-garth.

**Matricaria suaveolens* Buch. Railway goods yard between the seashore and the railway, Pensarn, *Thomas* sp.

Tanacetum vulgare L. In a lane from Old Colwyn to Bettws-yn-Rhos, *Ogle*. Roadside, Llanrwst Road, above Colwyn Bay, *Russell*. Roadside ditch about one and three-quarter miles from Rhuddlan, towards Abergele. Plentiful in a field below Henllan School. A few plants by roadside half a mile or so west of Henllan. Roadside close to a farm east of Foel Greon, on the Llansannan Road. A patch by a hedge running down to the stream north of Pen porchell uchaf and parallel and close to a narrow plantation (between Llansannan and Henllan). By a ruined cottage on the Clocaenog Road, just outside Ruthin. A few plants by the roadside west of Pentre, between Clocaenog and Pont uchel. Field side of a hedgerow by the road near Cotton Hall, Whitchurch. Not far from a farm near Pont uchel, on the Rhewl Road. Bank of field bordering the road, a quarter of a mile south-west of Llangynhafal Church.

Artemisia Absinthium L. Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Little Orme, *Price.* Bryn Euryn, *Price.* Llandegla, *J. M. H. & W. H.* A few plants near Lletty piod, Llanarmon Mynydd Mawr, *G. Loftus.* Near Llewesog Mill, near Denbigh. Near a cottage close to Cerrig-y-Druidion. In quantity about Rhwng-y-ddwy-afon and Meifod, between Cyffylliog and Nantglyn. By Bryn-isaf, south-east of Llanrhydd, at 800 ft. Oernant, between Llangollen and Ruthin, at 1050 ft. About a farm called Park, west of Llyn Moelfre. By a farm above Lloran-isaf, south of Moelfre. Plentiful about Glan Tanat-isaf.

**Petasites fragrans* Presl. Miss Thomas tells me that she has been informed that the Winter Heliotrope grows in a lane at Ruabon.

**Doronicum Pardalianches* L. Glascoed, near Llansilin, 1867, *Hb. Jones.* On right bank of Elwy immediately below "Julia's Bower," and in wood below Pont-yr-allt-goch, *Fl. B.* Cefn, 1898, *Russell.*

Senecio sylvaticus L. Llansilin, 1869, *Hb. Jones.* Llandudno neighbourhood, *Price.* Tal-y-Cafn, *Thomas.* Uplands, inland of Colwyn Bay, *Ogle.* Hill near Old Colwyn and Nant-y-glyn, *Russell.* About Taldrach, near Bylchau, south-west of Denbigh. Foel Greon. Near Llansannan. By the roadside on the north side of the Clywedog, a little to the east of Cyffylliog. Roadside east of Ffrith fawr, north of Cyffylliog, at about 1000 ft. Near Clawdd Newydd. Roadside on hill-crest between Ruthin and Clocaenog. Hills south-east of Llanrhydd. Near Moelfre. Moel Henfach. Seen sparingly on roadside between Llanrhaiadr-yn-Mochnant and Pistyll Rhaiadr. Cefn-y-coed, near Llangedwyn.

**S. viscosus* L. In sundry places on the coast [about Llandudno], *Inchbald.* Seashore, Colwyn Bay, *Russell.* Abundant amongst shingle on the beach about three-quarters of a mile east of Llanddulas.

**S. squalidus* L. Railway-bank near Brymbo, 1910, *Thomas* sp.

**S. erucifolius* L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Rhyd leos, near Llansilin, 1874, *Hb. Jones.* Pensarn shore, *Thomas*; conf., *A. A. D.* Nant-y-glyn, *Russell.* Frequent about the Little Orme, on the Rhos-Colwyn side, *Hodge.* Between Abergele and Rhuddlan. Bank by shore near Llanddulas. Roadsides about Trefnant. A few plants by roadside south of Coed Coppi, about one mile from Denbigh.

**S. sarracenicus* L. Glascoed, near Llansilin, *Miss E. F. Jones.* Occurs in the neighbourhood of Wrexham.

Carlina vulgaris L. Near Llangollen, 1872, *Hb. Harris.*

Pensarn shore, *Thomas*; conf., *A. A. D.* Bryn Euryn, *Russell.* Sandhills, Denbigh side of the Foryd, near the Ferry Hotel, *Hodge.* Llysfaen. Cefn-yr-ogof, Llanddulas. Shore between Llanddulas and Pensarn. Near the "Loggerheads."

**Arctium majus* Bernh. By a ruined cottage by roadside near Pen-y-ffordd, east of Abergele. Craig Wood, Denbigh. Woodland by "Lady Bagot's Drive."

Carduus pycnocephalus L. β *tenuiflorus* Curt. Abundant on the Orme's Head, *Inchbald.* Sandy ground, Llandudno, 1873, *Hb. Brown.* Embankment between the railway and the shore at Llysfaen, *Ogle.* Summit of Bryn Euryn, *Russell.*

C. crispus L. Near Glascoed, Llansilin, 1867, *Hb. Jones.* Llandudno, *Price.* A few plants between Henllan and Denbigh. Several examples by road between Bylchau and Denbigh. By the roadside about six miles from Corwen, towards Ruthin. By the roadside, north bank of Clywedog, a little to the east of Cyffylliog. Laneside below Coed Pennant, Clocaenog, not far from the road. Limestone quarry north-west of Ruthin. By the Clwyd between Llandyrnog and Llanrhaiadr. By road south of Graig lwyd. Nant-y-garth, near Ruthin. Pant-y-ffordd, above Llandegla. Llanarmon. By Pentre felin Station, near Llangedwyn. A small patch by roadside south of Llanrhaiadr-yn-Mochnant Station. An occasional plant seen between Penybont and Llansilin. Seen occasionally along the Tanat.

C. nutans L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Common at Llansilin, *Miss E. F. Jones.* Near Old Colwyn, *Ogle.* Llandudno. One plant by a farm above Derwen Hall. Limestone quarry north-west of Ruthin. Near Llangollen. Close to the road, five miles from Llangollen, towards Ruthin, at 1400 ft. Field south of Llyn Gweryd. A few plants in a field near Llanbedr. Cornfield between Llandyrnog and Llanrhaiadr. A few examples about the station and in adjoining field at Llanrhaiadr-yn-Mochnant.

**Cnicus heterophyllus* Willd. A patch by the Alwen at Llanfihangel Glyn Myfyr, *J. L. Harnaman.*

**C. acaulis* Willd. Plentiful in a field not far from Crow Castle, Llangollen, 1909, *Drinkwater.*

**Silybum Marianum* Gaertn. Llandudno, *Price.* Bryn Euryn and Little Orme, *Russell.* A large patch at one part of the Great Orme, *Hodge.*

Serratula tinctoria L. On the hillside facing the town [Llandudno], *Inchbald.* Bryn Euryn, *Russell.* By the side of the path in the wood skirting the lake at Llewesog, near Denbigh.

Centaurea Scabiosa L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Llandrillo-yn-Rhos Churchyard, 1868, *Hb. Harris.* Pensarn shore, *Thomas.* About Old Colwyn, *Ogle.* Colwyn Bay, *Russell.* Frequent on west side of Great Orme, *Hodge.* Llandegla, *J. M. H. & W. H.* Llandudno. Between Llanddulas and Llysfaen. Near Henllan. Roadside between Ruthin and Pont uchel. A few plants in the limestone quarry north-west of Ruthin. Llangollen neighbourhood. The Leet. Llanarmon.

C. Cyanus L. Near Llangollen, 1808 (*S. Hailstone*), *Hb. Hailstone.* Llansilin, 1867, *Hb. Jones.* Llandudno, *Price.* Railway cutting, Colwyn Bay, *Russell.*

Cichorium Intybus L. A little beyond Ruthin, *Hb. Potts.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Roadside between Llandudno and Llanrwst, *Inchbald.* Bryn Euryn, *Price.* In an upland pasture near Llanelian-yn-Rhos, *Ogle.* Cornfield, Abergele, *Thomas.* Cornfield, Llanelian Lane, *Russell.* Cornfield at Gresford, *Thomas.*

Picris echioides L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Old Colwyn neighbourhood, *Ogle.* Embankment by railway at Llysfaen; more plentiful here than at Old Colwyn, *Ogle.* Pensarn shore, *Thomas.* Field-path side near Llandrillo Farm, *Russell.* Llandudno neighbourhood. Near Llanddulas. Morfa Rhuddlan, in various places.

**Crepis taraxacifolia* Thuill. Meadows about Old Colwyn, plentiful, *Ogle.* Is now so abundant in all the meadows and along the roadsides from Colwyn to Rhos, that the fields are bright yellow with it in May and June. Its appearance dates from about sixteen years ago, since when it has rapidly spread over this area, and now forms a large proportion of the hay crop, *Russell.* Seen (a few examples only) by Mr. A. O. Walker and Dr. W. B. Russell in Nant-y-glyn in the early summer of 1895. First noticed by Dr. Russell in 1894 on Penmaen Hill. In the summer of 1896 Mr. A. O. Walker observed the plant in abundance in dry fields on a steep slope of Wenlock Shale, facing south-east.

**C. biennis* L. New Broughton, near Wrexham, *Drinkwater.*

**C. mollis* Aschers. (= *C. hieracioides* W. & K.). Marsh near Llandegla, August, 1909, *Hodge.*

C. paludosa Moench. Erthig [near Wrexham] (*Mr. Bowman*), *Hb. Potts.* Pont-y-mwynwr, Llanferres, *Hb. Potts.* Pistyll Rhaiadr, 1867, *Hb. Jones.* Still there. Glyn Ceiriog, *Payne.* By the river at Pont uchel. By the Clywedog below Diffwys. Woodland by "Lady Bagot's Drive," between Rhewl and Pont uchel. By the river above Cyffylliog.

**Hieracium vulgatum* Fr. Glyn Ceiriog, June, 1900, *Payne.* Nant Llanelian, on slaty clay, *Russell.*—β *maculatum* Sm. Near Llangollen, 1859, *Osw. F. C.*

H. sabaudum L. (= *H. boreale* Fr.). Common.

**H. lasiophyllum* Koch. Pistyll Rhaiadr, 1867 (teste *Rev. E. S. Marshall*), *Hb. Jones.*

H. murorum L. pt. (Agg.). Llansilin, 1868, *Hb. Jones.* "Clothing of the heads remarkable, and the leaves (I think) unusually hairy, but I cannot definitely say which variety," *Marshall.* Limestone cliff, top of Little Orme, *Russell.* Llanddulas, *Russell.* Several plants in the limestone quarry north-west of Ruthin, 1910.

**H. sciaphilum* Uechtritz. Llansilin, 1867 (teste *Marshall*), *Hb. Jones.* Wall-top near Chirk Fish Hatcheries, 1909, *Hb. Waterfall.*

Leontodon nudicaule Banks & Soland. (= *L. hirtum* L.). Moelfre, near Llansilin, 1868, *Hb. Jones.* Abundant on the shore banks about Old Colwyn, *Ogle.* Railway embankment, Colwyn Bay, *Russell.* Llysfaen. Henllan. Llangollen.

L. hispidum L. Glyn Ceiriog, *Payne.* Near Pwyll-y-Crochan Woods, *Russell.* Railway cutting, Pensarn, *Hodge.* Near Ruthin. Llangollen.

Taraxacum palustre DC. Pont-y-mwynwr, Llanferres, *Hb. Potts.*

**Lactuca virosa* L. Llysfaen Rocks, *Price.* On the limestone rocks above the road near Plas newydd, south of Llysfaen.

Tragopogon pratense L. Near Tal-y-Cafn Station.

T. minus Mill. Llansilin, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Pensarn shore, *Thomas.* Old Colwyn, *Ogle.* Abergele.

Jasione montana L. Llansilin, 1867, *Hb. Jones.* Above the tunnel between Llysfaen and Old Colwyn, *Ogle.* Moorland, Nant-y-glyn hills, *Russell.* By the Conway below Plas Rhyd-y-creuaeu, near Bettws-y-Coed. Laneside between Llanrwst and Pentre tafarn-y-fedw. Between Nantglyn and Llansannan. Lane near Pant-y-cefn, north-east of Llyn Aled. Roadside north-east of Pont uchel. Between Cyffylliog and Llewesog, ascending to 1050 ft. Roadsides and in many lanes between Cyffylliog and Nantglyn. Moelfre.

Wahlenbergia hederacea Reichb. Nant-y-glyn, *Russell.* Roadside above the Bull Inn, about three miles from Tal-y-Cafn Station, 1909, *Hodge.* Llanfihangel Glyn Myfyr, *J. L. Harnaman.*

Campanula Trachelium L. Railway-banks a short distance south of Gresford Station, July, 1874, *Hb. Brown.* Eyarth Woods, near Ruthin, *J. M. H. & W. H.* Coed Oerllwyn, between Ruthin and Denbigh. Occasionally in hedges between Pont uchel and Ruthin. Roadside between Bachymbyd bach and Pont uchel. Woodland adjoining limestone quarry north-west of Ruthin. Plenty in hedgerows and adjoining woodland, by roadside about two and a half miles from Ruthin, towards Clawdd Newydd. Several plants in hedgerow between Coed-y-Fron and Pont uchel. Rather frequent in the Ruthin neighbourhood. Along the road east of the railway and south of Ruthin.

C. latifolia L. The Rossett, Denbighshire, June, 1859, *Hb. Harris.* Glascoed Dingle, Llansilin, 1867, *Hb. Jones.* Wood by Elwy, north of Pont-yr-allt-goch, *R. H. Day.* Plentiful in the woodland, Nant-y-garth, near Ruthin. Abundant in a field below Cregian uchaf, Llanarmon, growing amongst Butterbur. Lane close to a farm about half a mile south-east of Llyn Gweryd, 1910. In the lane west of Llanarmon, at the commencement of the mountain road to Ruthin. Growing amongst Butterbur close to Pant-y-fford, above Llandegla. Undergrowth about the "Roft," Marford.

Vaccinium Vitis-Idæa L. The Berwyns. Above Llyn Llyn-Caws.

Oxycoccus quadripetala Gilib. Craig Berwyn (*Rev. W. E. Jones*), *Hb. Jones.* Near Pistyll Rhaiadr and in the cwm leading thereto, *Hancock.* Bogland south of Moel Sych; seen at 1800–2200 ft., *Loftus.*

**Limonium vulgare* Mill. (= *Statice Limonium* L.). Glan Conway to Llandudno Junction, *Russell.*

**L. bellidifolium* Dum. (= *S. reticulata* Sm.). Rocks by the Orme (*How*), *Osw. F. C.* Still there, 1909, *Hodge.*

Hottonia palustris L. Brick-pit ditches, Llandudno, *Price.*

Primula vulgaris L. *β variabilis* Goup. (=*P. vulgaris* × *P. veris* L., *fide* Darwin). Pont-y-mwynwr, Llanferres, *Hb. Potts* (as *P. elatior*). Glascoed, near Llansilin, 1869, *Hb. Jones.* Near Llanddulas Station, 1874, *Price.* Mr. J. E. Bowman's record in the *New Botanist's Guide* for *P. elatior* (near Wrexham) refers to this plant.

P. veris L. Llansilin, 1867, *Hb. Jones.* Between the Rossett and Caergwrle, 1869, *Hb. Harris.* Llandudno, *Price.* Llangollen, *Ruddy.* Llysfaen. Llanferres. Marford.

**Lysimachia vulgaris* L. Shingles by the Conway below Bettws-y-Coed, in company with *Vicia Orobus.* By the Clwyd at Pont-y-Cambwll. Abundant in swampy ground and ditches by the railway, between Denbigh and Llanrhaiadr. Several on margin of Llyn Moelfre, close to the boathouse.

Glaux maritima L. Field close to the shore at Pensarn, *Thomas* sp. Salt-marsh, Llandrillo-yn-Rhos, *Russell.* Llanddulas shore. Mouth of Clwyd. Near Llandudno Junction.

Anagallis arvensis L. Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Cefn Rocks, near Abergele, *Thomas.* Llanddulas. Llysfaen. Near Ffrith. Llanrhaiadr-yn-Mochnant.

A. tenella Murr. Near Llangollen, 1859, *Ows. F. C.* Ditch near Wern llyfnt, 1866, *Hb. Jones.* Llanrhaiadr-yn-Mochnant parish, *T. W. Hancock.* Damp spots on the shore-bank, Old Colwyn, *Ogle.* Bog, top of Moelfre uchaf, 1893, *Russell.* By the Clywedog above Diffwys, at 1300 ft. Near Llandudno.

**Samolus Valerandi* L. Wet places along the base of the Great Orme, west side, 1909, *Hodge.*

Ligustrum vulgare L. Abundant below Cefn, *Fl. B.* Clearly native on the limestone rocks of the Creuddyn Peninsula. Craig Wood, near Denbigh; perhaps native here. Rocks above the "Loggerheads."

**Vinca major* L. A relic of cultivation by a ruined cottage by roadside west of Gofer, near Abergele. Hedges on both sides of main road at Rhewl, north-west of Ruthin, in some quantity. Between Rhewl and Bôd-Ynys—a garden escape. A relic of cultivation by roadside five miles from Denbigh, towards Ruthin. Pen-y-palmant, Llandyrnog, 1909.

**V. minor* L. Gresford, *Hb. Potts.* Llangedwyn, 1867, *Hb. Jones.* Glyn Ceiriog, 1900, *Payne.* Amongst undergrowth on the hillside, Marford. Lane beyond Manley Wood, about a mile or so above Erbistock.

Blackstonia perfoliata Huds. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llandudno, *Price.* Pensarn shore, *Thomas.* Very common about Old Colwyn, *Ogle.* Gloddaeth and Llysfaen, *Russell.* Tower Hill, Abergele, and quarry behind Tan-yr-allt, *Thomas*. Railway cutting, Colwyn Bay, *Russell*. Bank by shore about half-mile east of Llanddulas. The "Roft," Marford.

Centaurium umbellatum Gilib. (=*Erythræa Centaurium* Pers.). Llansilin, 1867, *Hb. Jones*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Llandudno, *Price*. Shore bank at Old Colwyn, *Ogle*. Nant-y-glyn, *Russell*. Sparingly by roadside south-east of Ffrith fawr, at 800 ft.

C. vulgare Rafn. (= *E. littoralis* Fr.). Little Orme, *Russell*.

Gentiana Amarella L. In great abundance at Llanferres, *Hb. Potts*. Little Orme, *Russell*. Quarry near Eyarth Woods, near Ruthin, *J. M. H. & W. H.* Nant-y-glyn Hill, *Russell*. Roadside between Derwen and Llandegla, *Mr. Harnaman*. Llysfaen. Limestone quarry north-west of Ruthin—chiefly in the disused part. Between Ruthin and Llanferres. Great Orme.

G. campestris L. On the Orme's Head; frequent in the late autumn, *Inchbald*. Llandegla, *J. M. H. & W. H.* On a common skirting the moorland immediately above and south of a farm called Bryn llwyd, above Cyffylliog. Associated with *Viola lutea*.

Menyanthes trifoliata L. Moelfre Pool, 1867, *Hb. Jones*. About Llyn Creiniog. In quantity about Llyn-y-Cwrt.

Polemonium cœruleum L. Bank of the Tanat, near Glan Tanat [1865 or earlier], *Hb. Jones*. Mr. W. Whitwell writes that he was informed of this station by Miss Jones many years ago, and that he gathered specimens there in 1866. The plant was then growing among bushes on the bank of the Tanat not far from where the roads from Pen-y-bont fawr and Llanrhaiadr-yn-Mochnant unite to go on to Llangedwyn; it may have originated from some garden higher up the river. It is also said to occur at Llanyblodwell, six miles lower down the river, but in Shropshire. Near Glan Tanat Bridge, *Hancock*. On left of road leading to Pont-yr-allt-goch [from St. Beuno's College], just beyond small gate which leads to a small pool in a new plantation, opposite a red house, *Fl. B.* Plentiful in Nant-y-Ffrith, close to the stream on the Denbigh side, immediately after crossing the foot-bridge at the west end of the wood, near Nant-y-Ffrith Hall, *Hodge*. A clump by the gateway just as you turn from the road to descend towards Nant bach, near Cyffylliog.

Cynoglossum officinale L. Llandrillo-yn-Rhos, *Hb. Harris*. Not unfrequent on the sandy coast near Little Orme's Head, *Inchbald*. Shore between Pensarn and Llanddulas, *Thomas*. Gloddaeth Woods, *Williams*. Nant-y-glyn, on slate, *Russell*. Stony hillside between Chirk Fish Hatcheries and Chirk village, *Hb. Waterfall*. Llysfaen.

**Asperugo procumbens* L. Mr. Price mentions having seen this on the Llech in 1824, in company with Charles Darwin. In his *Llandudno Guide* he adds that it "seems smothered by nettles long ago." Occurred as a ballast plant at Colwyn Bay some years ago, *Russell*.

Symphytum officinale L. Pensarn brickfields, *Thomas*. Shore at Colwyn Bay, an escape, *Russell*. Railway embankment south of Llanrwst, close to the confluence of the stream and the Conway.

Railway-bank just outside Denbigh Station. Roadside, Cerrig-y-Druidion. By bridge over stream, close to Nantglyn Church. Roadside near Cotton Hall, Whitchurch. Below a cottage between Nantglyn and the Denbigh Road. Near Rossett.—Var. **β patens* Sibth. A large patch in a field by the footpath between Ruthin and Llanbedr.

**Borago officinalis* L. Ruins of Deganwy Castle, *Inchbald.* Field between shore and railway, near the railway bridge at Pensarn, *Thomas.*

Lycopsis arvensis L. Llandrillo-yn-Rhos, *Hb. Harris.* Llandudno, *Inchbald.* Railway cutting, Colwyn Bay, *Russell.*

Myosotis scorpioides L. Llansilin, 1867, *Hb. Jones.* By the Conway, near Llanrwst. Mouth of the Ddulas, close to the railway bridge, descending practically to sea-level. Near Bettws-y-Coed. By the Clwyd, near Llanynys. By the Clywedog, near Pont uchel. By the stream between Llanbedr and Ruthin. Swampy ground by stream running into the Tanat, by Glan Tanat-isaf.

M. collina Hoffm. Gresford (*Bowman*), *Hb. Potts.* Bryn Euryn, on limestone, *Russell.*

M. versicolor Sm. Llansilin, 1867, *Hb. Jones.* The Rossett, Denbighshire, 1869, *Hb. Harris.* Still there. Llandudno, *Price.* Nant-y-glyn hill, *Russell.*

Lithospermum purpureo-cœruleum L. Near Denbigh, *Hb. Potts.* There is also an example of later date in Miss Jones's herbarium, labelled: Near Denbigh, 1870, *Mr. R. Williams.*

L. officinale L. Rising ground near the River Alyn, south of Gresford, 1874, *Hb. Brown.* Little Orme, *Hodge.* Penmaen Rhos, *Russell.* Railway embankment near Gresford Station, *Hodge.*

L. arvense L. Near Denbigh, 1870, *Hb. Jones.*

Echium vulgare L. Craig Amyll, 1867, *Hb. Jones.* In waste and sandy ground [about Llandudno]; very abundant, *Inchbald.* Llandudno Warren, *Price.* Casual in garden at Flagstaff, Colwyn Bay, *Russell.* In the quarry, Deganwy, *Hodge.* Field, Bryn Euryn, and in old quarries on Pabo Hill, 1900, *Hb. W.* By the east side of the railway between Llandudno Junction and Glan Conway Station.

**Convolvulus Soldanella* Br. Colwyn Bay neighbourhood, 1862, *Price.* Pensarn shore, *Thomas.* Between Llanddulas and Pensarn. Llandudno.

C. arvensis L. Llandrillo-yn-Rhos, *Hb. Harris.* Pensarn shore, *Miss F. M. Thomas.* Old Colwyn, *Ogle.* Colwyn Bay, *Russell.* Near Ruthin, on the Denbigh Road. Roadside between Chirk and Fron Cysyllte.

**Cuscuta Trifolii* Bab. "I found quantities at Llansilin in 1871," *Miss E. F. Jones.*

Solanum nigrum L. Behind the Ferry Hotel, on the Denbigh side of the Foryd, *Hodge.* On the shore near Llanddulas, towards Pensarn.

**Lycium chinense* Mill. By ruins of an old cottage in Nant-y-garth. Erbistock.

Atropa Belladonna L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Near Llangollen, 1859, *Osw. F. C.* In the neighbourhood of Llanferres, *Drinkwater.* I am informed that it has occurred as a weed in the garden at Tan-y-Pistyll, Pistyll Rhaiadr.

Hyoscyamus niger L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llangollen, 1872, *Hb. Harris.* Eglwyseg Rocks, Llangollen, 1887, *Hb. Day.* On the shore by "Railway Cottage," Pensarn, *Thomas.* By the railway-crossing east of Abergele, *Thomas* sp. Not unfrequent around Llandudno, *Inchbald.* North of Abbey Road, near Llandudno, *Williams.*

**Verbascum virgatum* Stokes. Lane in Llai Township, Wrexham, *Hb. Potts.*

V. Thapsus L. Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Roadside, Chirk, 1872, *Hb. Brown.* Steep hillside by road below Chirk Fish Hatcheries, *Hb. Waterfall.* Some very fine specimens near Pont-y-ddol, *Fl. B.* Pensarn shore, *Thomas.* Little Orme, *Hb. Waterfall.* Bryn Euryn, *Russell.* Quarry near Eyarth Woods, *J. M. H. & W. H.* Trevor, *Drinkwater.* Railway embankment at Gresford Station, *Hodge.* Near Glan Conway Station. South of Llysfaen. Roadside, near top of hill, going from Pont uchel towards Coed Oerllwyn. Bank of Clwyd opposite mill, a little distance east of Derwen Station. Roadside south of Pont uchel, towards Clocaenog. Limestone quarry northwest of Ruthin. To the left of the road and on the adjoining hillside, Nant-y-garth, extending for about two and a half miles towards Wrexham. A few plants on shingle by the Tanat, near Glan Tanat-isaf. By the smithy above Llanrhaiadr-yn-Mochnant Station.

V. Lychnitis L. Gresford, August, 1832, *Hb. Potts.* The Roft, Marford.

**V. Blattaria* L. Rubbish-heap near Pont-y-ddol, *Russell.*

**Linaria Cymbalaria* Mill. Walls of Denbigh Castle, *Hb. Potts.* Still there. Llansilin, 1867, *Hb. Jones.* Llandudno, *Price.* Near Coed coch, near Llanelian-yn-Rhos, *Ogle.* Garden-wall near Colwyn Bay, *Russell.* Wall by a cottage, Moelfre, *Loftus.* Wall by Llangedwyn Hall, *Loftus.* Occurs in an unusual situation near Llanddulas, where it grows in fair amount amongst shingle on the shore, about three-quarters of a mile east of Llanddulas Station. Walls near Ruthin Church and adjoining inn. Walls about Denbigh and Ruthin. By the bridge and the chapel at Pont uchel. Chirk. Roadside between Chirk and Fron Cysyllte.

L. minor Desf. (= *L. viscida* Moench). In Henllan quarry, *Fl. B.* With other casuals at Glyn Ceiriog Station, 1900, *Payne.*

Antirrhinum Orontium L. Queried in *Top. Bot.* Cornfield above Mochdre, *Russell.*

Scrophularia aquatica L. By the Clwyd, near Ruthin.

S. nodosa L. Chirk, 1859, *Hb. Harris.* Llansilin, 1867, *Hb. Jones.* Nant-y-glyn, Colwyn Bay, *Russell.* Nant-y-garth. Woodland by limestone quarry north-west of Ruthin.

**S. vernalis* L. Still occurs in quantity in the classic locality near Llandudno. Has also been seen by Mr. W. Hodge in a new station in the neighbourhood of Colwyn Bay in 1910.

**Mimulus Langsdorffii* Donn. Banks of Dee, Llangollen, 1863 (*Lloyd*), *Hb. Jones*. Still occurs here. Several places on Elwy, *Fl. B.* Plentiful on both sides of the stream by Derwen Mill, near Meiarth Hall, *Thomas*. Still there in 1910. Below Pont-y-ddol on the Elwy, *Stapleton*. Glyn Ceiriog, 1900, *Payne*. Dried-up bed of pool, Chirk Fish Hatcheries, *Hb. Waterfall*. Ditch below the church, Llandegla, *J. M. H. & W. H.* A few plants seen by the Tanat, near Glan Tanat-isaf, *G. Loftus & A. A. D.* Extremely luxuriant and plentiful in woodland skirting the railway a mile or so north of Llanrwst. By a pool and small patch of swampy ground by a railway-bridge about a mile south of Llanrwst. Along the Clwyd near Derwen and Bryn Saith Marthog.

Veronica hederæfolia L. Llansilin, 1867, *Hb. Jones*. Llandudno, *Price*. Colwyn Bay neighbourhood, *Russell*. Cyffylliog.

V. Tournefortii C. Gmel. Llansilin, 1871, *Hb. Jones*. Roadside east of Abergele. Llandudno. Cyffylliog. Denbigh. Clocaenog. Llangollen. Roadside by Rhwng-y-ddwy-afon, near Cyffylliog. Cornfield close to Llanbedr. Moelfre. Llanrhaiadr-yn-Mochnant. Amongst introduced plants by the sidings at Llanrhaiadr-yn-Mochnant Station.

V. serpyllifolia L. *β *tenella* All. Among rocks by the Clywedog above Diffwys.

V. hybrida L. Plentiful on the limestone in the north-west extremity of the county. Also still occurs on limestone at Cefn, near St. Asaph.

V. montana L. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Llansilin, *Hb. Jones*. Llandudno neighbourhood, *Price*. Pwll-y-crochan Woods, *Russell*. On right bank of Elwy in wood below Pont-yr-allt-goch, *Fl. B.* Wood near Llanrwst, towards Pentre tafarn-y-fedw. Nant-y-ffrith.

V. scutellata L. Moelfre Pool, 1867, *Hb. Jones*. Still there, 1910. Moorland pastures above Colwyn Bay, *Hb. Waterfall*. Llyn-y-Fawnog, *Russell*. Llyn-y-Cwrt. Peat-bogs between Cerrig-y-Druidion and Glasfryn.

V. Anagallis-aquatica L. Dried-up bed of pool, Chirk Fish Hatcheries, *Hb. Waterfall*. Marsh, Llandrillo-yn-Rhos, *Russell*.

**Euphrasia brevipila* Burnat & Gremli. Llansilin, 1867 (teste *Arthur Bennett*), *Hb. Jones*.

**E. nemorosa* H. Mart. Common on the Great Orme, *Hodge*. Calcareous pastures by Pentre isaf farm, foot of the Little Orme, south-east side, *Hodge*. On limestone near Llysfaen.

**E. curta* Wetts. Great Orme, *Ellis*.

Orobanche major L. Near Llangollen, 1859, *Osw. F. C.* On broom near Old Colwyn, *Russell*. Creuddyn Peninsula, *Hodge*.

O. Hederæ Duby. Parasitic on the roots of the ivy on the Orme's Head, *Inchbald*. Still occurs.

Lathræa Squamaria L. In Colomendy Park, three miles from Mold, *Drinkwater*. By no means rare on Elwy, *Fl. B.* Near Minera, *T. Ruddy*. Manley Wood, Erbistock. By a stream which divides Flint and Denbigh, not far from the "Loggerheads," and in both counties. I observed it somewhere in the Llangollen area several years ago, but I do not recollect the precise station.

Pinguicula vulgaris L. Pistyll Rhaiadr neighbourhood, 1858, *Osw. F. C.* Marshy ground between Old Colwyn and Llysfaen, *Ogle.* Near the waterfalls above Diffwys. Swampy ground north of Pincyn Llus, near Cyffylliog.

Verbena officinalis L. On the hillside near the ruins of Gogarth Abbey, *Inchbald.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Near where mill-stream flows into the Elwy below Pont Newydd, *Fl. B.* On both sides of the ford, Peel Lane, Abergele, *Thomas.* By a wall in Old Colwyn, *Ogle.* Bryn Euryn, *Russell.* On the roadside near Ruthin, about one mile from the Ruthin end of Nant-y-Garth Pass, *J. M. H. & W. H.* Foot of Little Orme, *Hodge.* Roadside near a farm called Plas newydd, south of Llysfaen. Several plants by Melin-y-moch, between Pont uchel and Cyffylliog.

**Mentha rotundifolia* Huds. A large clump on a little island in the Tanat, a short distance east of the bridge below Llanrhaiadr-yn-Mochnant Station, *Loftus.*

M. longifolia Huds. **β nemorosa* Willd. By a ruined cottage by the roadside, about one and a half miles east of Abergele.

**M. piperita* L. Burton, near Rossett, *Thomas.* Pensarn shore, *Thomas.* About the mouth of the Ddulas, practically at sea-level. By the mill-pond by the Baptist Chapel, south-west of Llandyrnog. By the mill lodge, Melin-y-wern, north of Ruthin.

M. arvensis L. Llansilin, 1867, *Hb. Jones.* Field between Llanelian and Colwyn Bay, *Ogle.* Field near Coed-y-Fron, Clocaenog. Cornfield, Llanrhaiadr.

Lycopus europæus L. Moelfre Pool, 1867, *Hb. Jones.* Road to Llanelian from Colwyn Bay, *Russell.*

Origanum vulgare L. Near the Little Orme, *Russell.* Near Llangollen. Llysfaen neighbourhood, in abundance. Cefn-yr-Ogof. Near Henllan. Denbigh neighbourhood. Llanarmon. Roadside south of Llanarmon, near Rhyd-isaf. Near the "Loggerheads." By the roadside about twelve miles or so from Wrexham towards Ruthin. Marford. Gresford.

Clinopodium vulgare L. Llansilin, 1867, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Pensarn shore, *Thomas.* Nant-y-glyn, *Russell.* Bryn Euryn, *Price.* Common around Llandegla, *J. M. H. & W. H.* Derwen. Between Ruthin and Cyffylliog. Below Derwen Hall. Roadside about six miles from Corwen, towards Ruthin. Llanarmon.

Calamintha Acinos Clairv. Nant-y-glyn, *Russell.* Plentiful on the limestone banks and rocks south of Llysfaen. About Denbigh.

C. Nepeta Savi. Foot of Little Orme, *Hodge.*

C. montana Lam. (= *C. officinalis* Moench). Llandudno, *Price.* Railway embankment, Gresford, *Hodge.*

**Melissa officinalis* L. In a narrow lane by Pentre isaf farm, on the Rhos Colwyn side of the Little Orme, *Hodge.* Several plants on the south side of Pont-yr-allt-goch, on the bank adjoining the bridge and below the road.

Salvia Verbenaca L. Hillside near the Baths at Llandudno, *Inchbald.* On limestone at foot of Great Orme, *Russell.*

Nepeta Cataria L. Llangollen neighbourhood, 1859, *Osw. F. C.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Bryn Euryn, *Price.* Great and Little Orme, *Hodge.* In the hedge of a field skirting the road from Ruthin to Denbigh, to the east of the road, about one mile from Ruthin. Plentiful, and extending for about half a mile in the hedgerows on the south side of the Denbigh road, near Cotton Hall, Whitchurch.

Scutellaria galericulata L. Moelfre Pool, 1867, *Hb. Jones.* Apparently a very rare plant in North Wales. This is the only Denbigh record so far, and it appears to be absent from Flintshire.

S. minor Huds. Bog, Nant-y-glyn, *Russell.* Upland, inland of Old Colwyn, *Russell.*

Marrubium vulgare L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Little Orme and Bryn Euryn, *Price.* Great Orme. Below the limestone rocks and by the roadside south of Llysfaen.

**Stachys germanica* L. Eyarth Woods, near Ruthin, 1908; identification confirmed by Dr. Russell, *Hodge.*

S. arvensis L. Llansilin, 1867, *Hb. Jones.* Cornfield, Pabo, *Hb. Waterfall.* Nant-y-glyn Hill, *Russell.* Cornfield near Llangwstenin Lane, *Hb. Waterfall.* Near Rhyd eidion ganol, close to Llyn Creiniog, above Llansannan. Among oats by Diffwys, at 800 ft.

Galeopsis Ladanum L. (= *G. intermedia* Vill.). Llansilin, 1867, *Hb. Jones.*

G. speciosa Mill. Llansilin, 1867, *Hb. Jones.* Amongst potatoes, close to the old mill, Moelfre, *Loftus.* Near Llanarmon Mynydd Mawr. A solitary plant by side of lane south-east of Coed Pennant, Clocaenog.

G. Tetrahit L. var. **nigricans* Bréb. Appears to be about as frequent as the type. Observed up to an elevation of 1060 ft.

**Leonurus Cardiaca* L. Moelfre, near Llansilin, 1867, *Hb. Jones.* Still there, 1910, *Loftus.* On rubbish near cottages by cliff, Colwyn Bay, *Russell.* By the old mill, Moelfre, *Loftus.* Shingle on beach between Llanddulas and Pensarn.

**Lamium amplexicaule* L. Llandudno, *Price.* Not unfrequent near Gloddaeth Abbey, *Inchbald.* Rhos, near salt ditch, *Russell.* Waste ground on coast, Marine Drive, Llandudno, 1907, *Hb. Waterfall.*

**L. molucellifolium* Fr. (= *L. intermedium*). On one part of the Little Orme, 1910, *Hodge.* Mr. Hodge writes :—"On revisiting this station in August, much to my disappointment the plant was not visible. Either some 'botanist' had been there, or perhaps cattle had browsed upon the few plants."

**L. hybridum* Vill. By first farm on the right, going from Rossett to Kinnerton, *Thomas.*

L. maculatum* L. In the narrow cross-road that turns to the left off the Abergele road (beyond the quarry), which is followed in going to the upper reaches of Elwy, *i. e.* Waterworks Bridge, *Fl. B.* Pwll-y-crochan Woods, on the road leading to Mochdre, *Hodge*. Nearly opposite the smithy above Llanrhaiadr-yn-Mochnant Station, *Loftus*. Roadside about half a mile or so from Llanrhaiadr-yn-Mochnant, towards the station. Consists mainly of the type, but there is also a patch of the immaculate variety (β lævigatum* L.).

L. album L. Llansilin, 1867, *Hb. Jones*. Rare, and only seen in Elwy Valley, *Russell*. Roadside just below the post office, Pen-y-Bont, *Loftus*. Erbistock. Laneside east of Ruthin Station, towards Llanbedr. Roadside close to the smithy, about three-quarters of a mile west of Hendre-erwydd, near Llangynhafal.

L. Galeobdolon Crantz. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Llansilin, *Hb. Jones*. Minera, *Thomas*. Nant-y-ffrith and Glascoed, *Thomas & A. A. D*. Gloddaeth. Llanrwst neighbourhood. Pont uchel. Near Cyffylliog. Woodland by "Lady Bagot's Drive" between Pont uchel and Rhewl. Llangollen neighbourhood. Near Ruthin. Near Llanrhaiadr-yn-Mochnant. Wynnstay. Erbistock. Gresford. Marford.

Ballota nigra L. Roadside, Penrhyn, *Russell*. Foot of Little Orme, *Hodge*. Great Orme. Llanddulas. Roadside between Ruthin and Denbigh. Road from Ruthin Station towards Llanbedr. Between Llandyrnog and Llanychan. Roadsides south of Ruthin.

Plantago media L. Frequent in the limestone districts. Cai-Llan, Llansilin, 1867, *Hb. Jones*. Pensarn shore, *Thomas*. Llysfaen. Rhyd-y-Foel. Henllan. Near Denbigh. Cefn Caves. Llangollen. Eglwyseg Crags. Near the "Loggerheads." Marford.

P. lanceolata L. *var. *sphærostachya* Roehl. Cefn-yr-Ogof and Bryn Ddulas. Limestone rocks in the Leet.

P. maritima L. Llandudno, *Price*. Pensarn shore, *Thomas*. Sea-wall, Llandrillo and Great Orme, *Russell*. Mouth of Clwyd.

P. Coronopus L. Llandudno, *Price*. Pensarn shore, *Thomas*. Sea-wall, Llandrillo to Great Orme, *Russell*. Mouth of Clwyd. Extends all along the coast.

Littorella uniflora Aschers. Moelfre Pool, near Llansilin, 1867, *Hb. Jones*. Llyn-y-Fawnog, *Russell*. Llyn-y-Cwrt. Llyn Gweryd. Bed of Llyn Llyncaws, sparingly.

Scleranthus annuus L. Roadside, Viper Hill, Colwyn Bay, *Russell*.

**Chenopodium urbicum* L. On limestone near Llandrillo-yn-Rhos, *Russell*.

**C. Bonus-Henricus* L. Llansilin, 1867, *Hb. Jones*. Ruins of Deganwy Castle, *Inchbald*. Roadside, Cernioge. On the roadside by the bridge at Llanfihangel Glyn Myfyr. Near Cyffylliog Church. Below Clocaenog Church. Roadside by Cotton Hall, Whitchurch. Hedgerow by Ty coch, Llanrhaiadr. Between Llandyrnog and Llanrhaiadr. Moelfre. On shingle by the Tanat.

**Beta maritima* L. Llandudno—plenty by Tywyn, *Price*. Conway estuary.

Atriplex littoralis L. Eirias and sea-shore, Colwyn Bay, *Russell*. Clay embankment by the shore at the east end of Pensarn Promenade, *Hodge*.

*_A. hortensis_ L. Roadside near Bryn Euryn, _Russell._

*_A. laciniata_ L. Sands and gravel at the mouth of the Clwyd, on the Denbighshire side, _Hodge._

*_A. portulacoides_ L. Conway estuary.

Salicornia europæa L. Salt-marsh, Llandrillo-yn-Rhos, _Russell._ Mouth of Clwyd.

Suæda fruticosa Forst. Seashore, Llanddulas, _Russell._

Salsola Kali L. Llandrillo-yn-Rhos, 1868, _Hb. Harris._ Coast near Llandudno, _Inchbald._ Sand-hills, Foryd, 1909, _Hodge._

*_Polygonum Raii_ Bab. Seashore, Eirias, _Russell._ Sands by the mouth of the River Clwyd in the Foryd, both on the Rhyl and also on the Denbighshire side, _Hodge._

*_P. minus_ Huds. Between Conway and Tal-y-Cafn, near the beach, _J. G. Griffith._ Mochdre, with _Galium uliginosum_, _Russell._

P. Bistorta L. Llansilin, _Hb. Jones._

*_Fagopyrum sagittatum_ Gilib. Llansilin, _Hb. Jones._

Rumex sanguineus L. Llansilin, 1869, _Hb. Jones._ (Both the type and β _viridis_ Sibth.)

*_Daphne Laureola_ L. Near Llangollen, June, 1859, _Osw. F. C._ Limestone wood opposite Pabo, 1893, _Russell._ Wood skirting the Elwy below and north of Pont-yr-allt-goch. One shrub growing on bank above road between Ruthin and Pont uchel, in company with _Lathyrus sylvestris._ Erbistock.

Viscum album L. In a garden at Llanrhaiadr-yn-Mochnant, on apple.

*_Euphorbia dulcis_ L. Glascoed Dingle, near Llansilin, 1867, _Hb. Jones._ I believe this represents the first British record for this species. The plant was collected by Miss Jones and identified by Professor Babington, hence the record in Babington's _Manual_: Glascoed Dingle, Llansilin. This plant was introduced into British gardens in 1759 from Southern Europe. The "Dingle," which adjoins Glascoed House (Glascoed fawr), is a hollow cut across by a drive. The southern portion—the lower one—is soft and wet; the upper portion is dry with soft grass, and of irregular surface, running into small banks. It is an interesting place botanically, as several introduced plants have been observed here by Miss Jones and Mr. Whitwell. Miss Jones writes in reply to an enquiry:—"I don't know if any botanist lived there [_i. e._ Glascoed]. I have often wondered myself. The place belonged at one time to the Cyffins. . . . The then Speaker Sir William Williams, ancestor of the Wynns, married the heiress of the house. Glascoed was at that time a much larger place than it is now." This information suggests a very possible, even probable, origin for the non-native plants (e. g. _Galanthus nivalis_, _Doronicum Pardalianches_, _Senecio sarracenicus_). On this point Mr. Whitwell writes:—"May not the plants in question be surviving representatives of some of those in the original garden? Although the Dingle now presents no quarry-like aspect, yet it may have been the source of building materials for the property, which stands on millstone grit, and then itself have been laid out as garden and grounds—abandoned to wildness when the status of the house was lowered." Although Miss Jones's herbarium specimens are dated 1867, she had observed the *Euphorbia* and the *Doronicum* some years earlier. Mr. Whitwell informs me that he was taken by Miss Jones in 1866 to see and obtain specimens for himself. Mr. Whitwell adds that the plant was growing on small banks in the Upper Dingle.

E. Paralias L. Colwyn neighbourhood, 1862, *Price*. Pensarn shore, *Thomas*. Shingle between Pensarn and Llanddulas.

E. exigua L. Llansilin, *Hb. Jones*. Roadside, Llanelian, *Russell*. Trevor, 1901, *Osw. F. C.* Seashore, Llandrillo-yn-Rhos, *Russell*. Shingle on shore east of Llanddulas Station, with *E. Peplus*.

**E. Lathyrus* L. Wrexham and Llangollen, *Drinkwater*.

Humulus Lupulus L. Llansilin, 1867, *Hb. Jones*. Eirias and Colwyn Bay, *Russell*. By the roadside near the River Ddulas, west of Llysfaen. In a hedge close to the school at Clocaenog. Hedge by road between Rhewl and Bod Yynys. Hedge near Glan-yr-afon, north of Clocaenog, near a large cherry tree. Between Llandyrnog and Bodfari. Hedgerow close to where stream crosses road by county boundary, below Pen-y-rhiw, near Pen-y-bont. Hedgerow one and a third miles south-east of Llanrhaiadr-yn-Mochnant, towards Oswestry, close to bridge over the Iwrch.

Parietaria ramiflora Moench. On the sides of the cliff [Llandudno] in wild abundance, *Inchbald*. Abundant on the ruins of Rhos Abbey, *Ogle*. On walls and limestone rocks [in Colwyn neighbourhood], especially near the sea, *Russell*. Roadside bank or wall by a cottage below Llawog, Llanynys.

Carpinus Betulus L. Llandudno, *Price*. Colomendy Park, three miles from Mold, *Drinkwater*. The Orme, common on limestone, *Russell*. Extending for about half a mile in the hedgerows by the Denbigh road, south-east of Moel Fodiar. A number of trees forming a kind of avenue leading up to Nant bach, north-west of Cyffylliog; doubtless planted here. A number of trees in a hedge by the roadside between Llanbedr and Mold. Several trees by Llanbedr School, and extending as a hedge shrub for some distance towards Llangynhafal. Plantation and adjoining hedgerow about half a mile east of Llanbedr, on the Mold road. Lane beyond Manley Wood, about a mile or so above Erbistock. Roadside near Marford.

Quercus Robur L. (= *Q. pedunculata* Ehrh.). Forming an apparently native woodland on the south-east slope of Bryn Du (between Diffwys and Rhwng-y-ddwy afon), extending for about a mile, and ascending to about 1000 ft. Prominent associated plants in this woodland were *Leucobryum glaucum* (forming large hummocks), *Corydalis claviculata*, and *Vaccinium Myrtillus*.

Q. sessiliflora Salisb. Llansilin, 1867, *Hb. Jones*. Woods in the Ffrith, *Hodge*. Near Valle Crucis Abbey.

Salix fragilis L. Morfa Rhuddlan.

S. fragilis L. × *S. alba* L. (= *S. viridis* Fr.). Llansilin, 1867, *Hb. Jones*.

S. repens L. Boggy places, Moelfre uchaf, *Russell*. Conway Marsh, *ibid*.

**Populus alba* L. Llandudno, *Price.* In several places on Morfa Rhuddlan.

P. alba L. × *P. tremula* L. (= *P. canescens* Sm.). Roadside near Bryn Coch, *Hb. Jones.*

P. tremula L. Clothes a hillside on the headland [Llandudno], *Inchbald.* Near a farm called Oddiar-y-llyn, south-west of Llyn Moelfre, *Loftus.* Between Clawdd Newydd and Derwen Hall. Between Clocaenog and Clawdd Newydd. Near the top of the hill between Pont uchel and Ruthin. Near Llansilin.

**P. nigra* L. Brook-side near Llansilin, June, 1871, *Hb. Harris.* Brook-side near Frydlyn, 1871, *Hb. Jones.* This is doubtless the same station as the preceding. Morfa Rhuddlan. Near Llanddulas. Several trees by roadside a mile or so west of Henllan. Some large trees by the Clwyedog, near Rhewl. Not uncommon by many of the rivers and larger streams.

Empetrum nigrum L. "One evening my wife, Henrietta, and myself, attended by John Jones, went upon the Berwyn a little to the east of the Geraint or Barber's Hill to botanize. Here we found a fern [*sic*] which John Jones called *Coed llus y Brân*, or the plant of the crow's berry. There was a hard kind of berry upon it, of which he said the crows were exceedingly fond" (G. Borrow, *Wild Wales*). Previously noted in this neighbourhood by H. C. Watson (*New Botanist's Guide*): Hills round Llangollen, 1000 ft. and upwards. Pengweli, 1867, *Hb. Jones.* Llandegla, *J. M. H & W. H.* About Llyn Aled. Cefn Du, near Clocaenog. About Llyn Bran. Moorland south-west of Nantglyn. By the Clywedog above Diffwys. Bryn Du, west of Cyffylliog. Nerquis Mountain. On the Berwyns, *e. g.* above Llyn Llyncaws.

**Juniperus communis* L. Stunted bushes are scattered over the headland [Llandudno], *Inchbald.* Limestone hills, Pabo, *Russell.*

Taxus baccata L. Llandudno, *Price.* Native on limestone rocks at Llysfaen. Limestone rocks near the "Loggerheads." Quite native here.

**Stratiotes Aloides* L. Very plentiful in a pond about half a mile from Gresford, to the right of the back road towards Wrexham, *Drinkwater.*

Neottia Nidus-avis Rich. Halton Wood, near Chirk, 1863, *Osw. F. C.* "Two specimens brought from banks of Elwy somewhere below 'Julia's Bower' [Gallt faenan]. I [Father Horn] am not sure of the spot," *Fl. B.* On the Denbigh side of Maes Mynan wood, near Caerwys, *Mrs. New.*

Listera cordata Br. ["Seen in two or three places about Llansilin," *Miss Jones.* I fancy there may be some slip here, perhaps a *lapsus plumæ*, and think the following species may be intended, as there is no reference to *L. ovata* in the catalogue of Miss Jones's collection.] Near Llangollen, 1859, *Osw. F. C.* "It seems to be pretty generally distributed. On the moors in several places north and south of the Dee. Near the boundary which divides the counties of Merioneth and Denbigh, south of Moel Ferna, on the Berwyns, 1890," *T. Ruddy.*

L. ovata Br. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Chirk, 1859, *Hb. Harris.* Near Llangollen, 1859, *Osw. F. C.* Near "Julia's Bower" [Gallt faenan], *Fl. B.* Woods by the quarry near Denbigh, *Fl. B.*; conf., *A. A. D.* Abundant in woods on banks of the Meirchion, *Fl. B.* Tower Hill, Abergele, *Thomas.* Right bank of Elwy below Pont Newydd, *Stapleton.* Pen-y-llan, Erbistock, *Loftus.* Woods about the Cefn Caves, *Hodge.* Railway embankment, Colwyn Bay, *Russell.* In the woodland by the limestone quarry north-west of Ruthin. Nant-y-garth. Roadside north of Pentre bwlch, between Llangollen and Ruthin. Near Gresford. Erbistock.

**Spiranthes spiralis* Koch. Plentiful on the slope just above the church [Llandudno], *Inchbald.* Bryn Euryn and fields about Little Orme, abundant, *Russell.* Miss Thomas tells me that she has been informed that this occurs in the Gresford area. The precise station is advisedly suppressed. Plentiful on the limestone slopes and in some of the old pastures about Llysfaen. A typical plant of the carboniferous limestone elevations in the littoral portion of the county.

Helleborine latifolia Druce. In Gloddaeth and Bodsgallen woods, *Inchbald.* "Mr. Meyer found one specimen on the road which runs up the river parallel to it (not the cart-road but the main road) on the Denbigh side of Pont Newydd. Nearly opposite Salmon Leap," *Fl. B.* "Seen in two or three places about Llansilin." In a field above the Dingle at Glascoed, near Llansilin, *Miss Jones.* Hedgeside of wood, Llanelian Road, *Russell.* Near Mochdre, *ibid.* In the woods by Dyffryn Aled, between Llansannan and Henllan, 1910. This confirms a record of Bingley's of more than a century ago: "*Serapias latifolia*, Common Helleborine. By the roadside leading from Henllan to Llansannan, Denbighshire, about two miles from the former place." Wood by the Elwy north of Pont-yr-allt-goch. Woodland skirting road between Cyffylliog and Melin-y-moch. Near Clocaenog. Wood south-east of Nantglyn. Near Rhwng-y-ddwy afon (a solitary plant). Coed-y-pentre, Cyffylliog. Coed-y-fron, Clocaenog. Wood by roadside north-west of Derwen, near Ffynnon-Sarah. Wood between Ruthin and Clocaenog. By "Lady Bagot's Drive," between Rhewl and Pont uchel. In the Leet, not far from the "Loggerheads," and close to the county boundary.

**H. atrorubens* Druce (= *Epipactis ovalis* Bab.). This orchid affects the most barren limestone rocks [on Great Orme], braving the full scorch of the noonday sun, often where only *Pyrus Aria* is found, *Inchbald.* In *Faunula Grustenis* there is a record of somewhat doubtful identity at the present time, but which I think refers to the present species: "*Epipactis rubra.* In Nant Bwlch-y-gwynt [near Llanrwst], *Mr. R. Roberts.*" Great Orme, *Hodge.* Gloddaeth Rocks, *Russell.* Several plants seen by Mr. W. Hodge on limestone, within six miles of Wrexham, 1910. Near Llysfaen. Appears to be a typical plant of the limestone cliffs.

H. longifolia Rendle & Britten (= *Epipactis palustris* Crantz.). Used to occur sparingly in the alluvial ground between Llandudno and Conway. Cultivation may have exterminated it, *Inchbald*.

Orchis pyramidalis L. Sychtyn, 1867, *Hb. Jones*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Henllan quarry, *Fl. B.* Little Orme, *Drinkwater*. Sparingly distributed on the ledges of the limestone cliffs near Llysfaen, *Ogle*. Bryn Euryn, *Russell*.

O. morio L. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Rossett, *Thomas* sp. Common in Colwyn Bay area, *Russell*. Field between Marchwiel and Erbistock. Is doubtless much commoner and more widely distributed than these scanty records indicate.

O. latifolia L. Llyn-y-Fawnog and Nant-y-glyn, *Russell*. There is some doubt as to whether this is *Orchis latifolia* or *O. incarnata*. *O. latifolia* L. is, however, already recorded for Denbigh in the *Flora of Anglesey and Carnarvon*:—Between Deganwy and Llandudno. I have also seen it about the swampy margins of Llyn Creiniog above Llansannan.

Ophrys apifera Huds. I have Denbighshire records for the Bee Orchis from seven or eight stations, all on limestone. As it is by no means a common plant and plant collectors are frequent, it is undesirable that the stations be too precisely indicated.

**O. muscifera* Huds. Dr. Russell informs me that he had an undoubted Denbigh specimen of Fly Orchis sent him some time ago. This solitary record of its occurrence in Denbighshire refers to a station in the northern portion of the county.

Habenaria conopsea Benth. Abundant on the headland [Llandudno], *Inchbald*. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Llysfaen, *Russell*. Llandegla, *J. M. H. & W. H.* Great Orme. Woodland skirting limestone quarry north-west of Ruthin.

H. viridis Br. Pont-y-mwynwr, Llanferres, *Hb. Potts*. Llandegla, *J. M. H. & W. H.* Chirk.

H. bifolia Br. On the hill above Fron frys, Glyn Ceiriog, 1860, *Osw. F. C.* On the Denbigh side of Maes Mynan wood, near Caerwys, *Mrs. New*. Field by the pathway ascending the Great Orme from Gogarth, *Williams*. Near Abergele, *Mrs. Fletcher*. High hill Nant-y-glyn; only one specimen seen, *Russell*.

**H. virescens* Druce (= *H. chloroleuca* Ridley). Llansilin, *Hb. Jones*. On the banks of the Meirchion, at the beginning of the wood above Pont-y-pant, right bank, *Fl. B.* Llanddulas, *Russell*. Chirk.

Iris fœtidissima L. Said to occur in Gloddaeth Woods, *Inchbald*. In quantity by roadside near entrance to Nant-y-garth from Llandegla, *J. M. H. & W. H.*

Narcissus Pseudo-Narcissus L. On banks of the Elwy opposite Cefn, below Pont Newydd, *Fl. B.* On island in Clwyd, just below Pennant's Reach, *Fl. B.* Thickets under Pen-y-graig rocks, Glyn Ceiriog, 1870, *Hb. Jones*. Mr. Whitwell, who has seen the specimens, writes:—"It is a very tall (twenty inches above ground) and large-flowered form; flowers twice as large as type—perianth divisions equalling the corona. Miss Jones has named it *major*, but I cannot satisfactorily determine it to be other than *N. Pseudo-Narcissus* proper, very large." Abundant in a meadow on

Ty newydd farm, Cyffylliog. Plentiful in a meadow locally known as "Cae rhos goch" (*i.e.* Daffodil Field), at Cefn irwch fawr, Cyffylliog. Nant-y-ffrith (planted).

**N. poeticus* L. (fl. pleno). Among thickets near the hedge in a field near the Bryn, Mynydd-y-Bryn [near Llansilin], 1872, *Hb. Jones.*

**Galanthus nivalis* L. Glan-yr-afon woods [near Llanferres], Feb. 1832, *Hb. Potts.* Pont-y-mwynwr, Llanferres, *ibid.* Glascoed Dingle, 1867, *Hb. Jones.* In the woods, Pwll glas, near Ruthin; the place seemed wild enough, *J. M. H. & W. H.* Erbistock, near the river, *Loftus.*

Tamus communis L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Gresford, 1874, *Hb. Brown.* Burton, near Rossett, *Thomas.* Colwyn Bay, *Russell.* Roadside hedges north-east of Bylchau (between Pentre Foelas and Denbigh), at 740 ft. elevation. Between Ruthin and Cyffylliog. Rossett. Marford. Erbistock. Wrexham neighbourhood.

**Ruscus aculeatus* L. Erddig Wood, near Wrexham, *Drinkwater.* Hedgerow near Mochdre, 1911, *W. Hodge.*

**Polygonatum multiflorum* All. Elwy, *Fl. B.* "Robertson marks this for wood on right bank of Elwy, below Pont-yr-alltgoch," *Fl. B.*

Convallaria majalis L. Occurs in at least two stations on the limestone, where it is probably native.

**Allium vineale* L. var. *bulbiferum* Syme. On the Orme's Head, *Inchbald.*—*Var. *compactum* Thuill. In a field between the shore and the railway, near Pensarn, *Thomas* sp.

**Scilla verna* Huds. Plentiful on limestone near the coast in the north-western portion of the county.

**Lilium croceum.* Two plants on the bank of the Conway between Bettws-y-Coed and Llanrwst, not far from the former. Carried here probably from garden higher up the river.

**Colchicum autumnale* L. Pen-y-bont near Llangedwyn, *Hb. Jones.*

Narthecium Ossifragum Huds. Craig Berwyn, 1867, *Hb. Jones.* Seen there, 1910, *A. A. D.* Moorland south of the Black Dingle, near Colwyn Bay, *Ogle.* Swamp between Cerrig-y-Druidion and Cernioge. Llyn-y-Cwrt. Swampy ground north of Pincyn Llus, near Cyffylliog.

Paris quadrifolia L. Llanferres, *Hb. Potts.* In woods about Llangollen, *Science Gossip*, 1884. Near Llangollen [Berwyn neighbourhood], July, 1887 (*Miss E. M. Wood*), *Hb. Day.* In Colomendy Park, three miles from Mold, *Drinkwater.* By a stream which divides Flint and Denbigh, not far from the "Loggerheads," and in both counties, *Thomas & A. A. D.* Copse on Wright's Farm, Llandegla, *J. M. H. & W. H.* Pen-y-llan, near Erbistock, *Loftus.* Craig Wood, Denbigh. Nant Barcutan, Pont uchel. Nant-y-garth.

Juncus Gerardi Lois. Llandrillo-yn-Rhos Marsh, *Russell.* Mouth of Clwyd.

J. maritimus Lam. Near Llandudno.

J. sylvaticus Reich. Moelfre Pool, 1869, *Hb. Jones.* Still there, 1910. Llyn Gweryd. By the Conway above Llanrwst. Llyn-y-Cwrt. Pincyn Llus, above Cyffylliog.

**Luzula multiflora* DC. Moelfre Pool, *Hb. Jones* (*β congesta*).

L. pilosa Willd. Sycharth Wood, near Llansilin, 1875, *Hb. Jones*. Llansilin, 1867, *ibid*. Glan Conway, *Russell*. Near Llanrwst. Near Pont uchel.

L. sylvatica Gaud. Sycharth Wood, 1867, *Hb. Jones*. Gresford, 1870, *Hb. Harris*. Still there. Nant-y-ffrith Woods, Denbigh side, *Hodge*. Nant-y-glyn and Moelfre uchaf, *Russell*. Near Llanrwst. By the Conway above Llanrwst. Wood by road at Pont uchel. Near Llangollen. About Pistyll Rhaiadr. Manley Wood, Erbistock.

Typha latifolia L. Ditches by railway about Llanrhaiadr. Abundant about margin of Llyn Gweryd.

**T. angustifolia* L. Llyn Creiniog, above Llansannan.

**Sparganium neglectum* Beeby. Moelfre Pool, 1867, *Hb. Jones*. "Probably *neglectum*, but plants too young for positive determination. Have the habit of *neglectum*," *W. H. Beeby in litt.* I saw undoubted *neglectum* in Moelfre Pool in 1910. Pensarn brickfields, *Thomas*. Morfa Rhuddlan.

S. simplex Huds. Llangwstenin, *Russell*.

Lemna minor L. Near Pensarn, *Thomas*. Morfa Rhuddlan. Pool by roadside near Llewesog Mill, near Denbigh. The Duckweeds seem to be uncommon in this county.

**Elisma natans* Buch. In the canal at Llangollen, *Drinkwater*.

Alisma ranunculoides L. Ditches, Llangwstenin, *Russell*.

**Butomus umbellatus* L. Probably native in one station on the coast. Bryn Estyn, near Wrexham; introduced, *Drinkwater*.

Potamogeton polygonifolius Pourr. Frequent in moorland plashes and upland situations. Craig Berwyn, 1867, *Hb. Jones* (*ericetorum* form). Still there. Above Pistyll Rhaiadr. Hill country around Llansannan. Moors about Cyffylliog. Moorland ditches and plashes about Llyn Bran. Moel Arthur.

P. crispus L. Llansilin, 1868, *Hb. Jones*. Llyn Bran.

**P. pectinatus* L. Llandrillo-yn-Rhos, *Russell*. Morfa Rhuddlan.

Ruppia maritima L. Salt-marsh, Llandrillo, *Russell*.

Scirpus fluitans L. By Black Dingle, with *Hypericum elodes*, *Russell*.

S. maritimus L. Llandrillo-yn-Rhos, July, 1868, *Hb. Harris*.

**S. Tabernæmontani* Gmel. Salt-marsh ditches, Llandrillo-yn-Rhos, *Russell* sp.

Carex pulicaris L. Bogland between Cerrig-y-Druidion and Cernioge. By the stream above Diffwys, at 1400 ft. About a mile south-east of Llyn Bran. Swamp by Pont Petrual, in company with *Hypericum elodes*.

C. arenaria L. Seashore near Colwyn Bay, *Russell*. Near Llandudno.

C. paniculata L. Moelfre Pool, 1871, *Hb. Jones*. In ponds on Conway Road to Bryn Euryn, *Russell*. Swamp about Llyn Creiniog, above Llansannan. Swampy ground on the south-east side of Llyn Gweryd (= var. *rigida* Blytt).

C. contigua Hoppe (= *C. muricata* auct. angl.). Near Cefn Caves, Denbighshire, May, 1873, *Hb. Brown.* By roadside between Clocaenog and Ruthin. Erbistock.

C. curta Good. Moelfre Pool, 1871, *Hb. Jones.*

C. elata All. (= *C. stricta* Good.). Vicarage Moss, Gresford (*Mr. Bowman*), *Hb. Potts.*

C. pilulifera L. Gresford (*Mr. Bowman*), *Hb. Potts.* Skirting some marshy ground west of Moel Llech.

C. pallescens L. Glascoed, 1871, *Hb. Jones.*

C. pendula Huds. Halton Wood, near Chirk, 1863, *Osw. F. C.* Burton and Golley, *Thomas.* Gresford. Erbistock. Woodland by "Lady Bagot's Drive," between Pont uchel and Rhewl.

C. distans L. Salt-marsh, Llandrillo-yn-Rhos, *Russell.*

C. fulva Host. Gwersyllt Mill (*Mr. Bowman*), *Hb. Potts.*

C. flava L. Damp ravine on moors above Colwyn Bay, 1900, *Hb. Waterfall.* Llyn Creiniog, above Llansannan. Near the stream above Diffwys, at 1350 ft. Marshy ground west of Moel Llech. Marshy ground above Pistyll Rhaiadr.

C. acutiformis Ehrh. (= *C. paludosa* Good.). Ditches, Morfa Rhuddlan. Between Abergele and Rhuddlan.

C. inflata Huds. Moelfre Pool, near Llansilin, *Hb. Jones.*

C. vesicaria L. Llyn Creiniog.

**Phalaris canariensis* L. Several plants growing in company with various aliens at Llanrhaiadr-yn-Mochnant Station, 1910.

Alopecurus myosuroides Huds. Queried in *Top. Bot.* Llansilin, 1869, *Hb. Jones.*

A. æqualis Sobol. Gresford (*Bowman*), *Hb. Potts.*

Milium effusum L. Sycharth Park, near Llansilin, 1869, *Hb. Jones.* Wood near Llanrwst.

Phleum arenarium L. Near Llandudno. Pensarn. Pensarn to Foryd.

**Agrostis nigra* With. Llansilin, 1869, *Hb. Jones.*

Ammophila arenaria Link. On the sandy coast fronting Conway Bay, *Inchbald.* Between Pensarn and Llanddulas.

Aira caryophyllea L. Near Clawdd Newydd. Pincyn Llus, near Cyffylliog. Between Clawdd Newydd and Llanfihangel Glyn Myfyr. No doubt commoner and more widely distributed than these scanty records indicate.

Trisetum flavescens Beauv. Llansilin, 1868, *Hb. Jones.* Near Llandudno. Llysfaen. Llanddulas. Near Denbigh. Henllan. Erbistock.

Avena pubescens L. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Eriviatt, near Denbigh. Near Llandudno.

Kœleria gracilis Pers. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Near Llandudno. Llysfaen.

Melica nutans L. (= *M. uniflora* Retz). Pont-y-mwynwr, Llanferres, *Hb. Potts.* Llansilin, *Hb. Jones.* Bryn Euryn, *Russell.* Near Llanrwst. Pont uchel. Near Cyffylliog. Nant-y-garth, near Ruthin. Near Llanrhaiadr-yn-Mochnant. Marford. Gresford.

Briza media L. Llansilin, 1868, *Hb. Jones.* Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llysfaen. Llanddulas. Llandudno.

Henllan. Near Denbigh. On a common above Cyffylliog, towards Pincyn Llus. Llangollen. Erbistock.

Poa nemoralis L. Llansilin, 1871, *Hb. Jones*. Boggy wood below Llysfaen, *Russell*. Erbistock, *Mason*. Llanrwst. Woodland near Cyffylliog. Pont uchel. Near Ruthin. Gresford.

Glyceria fluitans Br. Brookside near Woodhill, Lloran, 1869, *Hb. Jones*. Pensarn brickfields, *Thomas* sp. Morfa Rhuddlan. Llyn Bran.

**G. plicata* Fr. Pensarn, *Thomas* sp. Ditch near Llanrhaiadr.

Festuca rigida Kunth. "Gathered at Crow Castle, Langollen," *Hb. Potts*. Pensarn shore, *Thomas* sp. Llysfaen. Llanddulas. Near Henllan. Near Llangollen.

**F. rubra* L. Shingle at Pensarn. Between Llanddulas and Pensarn. Pensarn to Foryd.

**Bromus arvensis* L. Seashore, Colwyn Bay, *Russell*. I have not seen specimens.

Agropyron junceum Beauv. Pensarn. Shingle between Llanddulas and Pensarn. Near Llandudno. Pensarn to Foryd.

Hordeum nodosum L. Llandrillo-yn-Rhos, July, 1868, *Hb. Harris*. Pensarn, *Thomas*.

H. murinum L. Pensarn, *Thomas*. Limestone rocks near Llysfaen.

**Elymus arenarius* L. On the sandy coast fronting Conway Bay, *Inchbald*.

Asplenium Adiantum-nigrum L. Lledrode Hill, 1866, *Hb. Jones*. Between Ruthin and Llangollen, 1860, *Hb. Harris*. Rocks by stream above Diffwys, at 1350 ft. Near Cyffylliog. Shady lane west of Hendre-erwydd, near Llangynhafal.

**A. marinum* L. Apparently confined to one station.

A. Trichomanes L. Pont-y-mwynwr, near Llanferres, *Hb. Potts*. Glascoed Dingle, 1874, *Hb. Jones*. Upper reaches of Elwy, *Fl. B*. Eyarth Woods, near Ruthin. Near Llysfaen. Rocks in wood by roadside between Llanrwst and Pentre tafarn-y-fedw. Rocks by the stream above Diffwys, at 1350 ft. Llangollen neighbourhood. Near Ruthin. Llanferres. Near Llandegla. Llanrhaiadr-yn-Mochnant.

A. Ruta-muraria L. Abundant on a wall near Pensarn. Near Llysfaen. Llanrwst neighbourhood. Near Ruthin. Llanrhaiadr-yn-Mochnant.

Ceterach officinarum Willd. Recorded from three Denbighshire stations, which it is undesirable to specify.

Phyllitis Scolopendrium Newm. Llanferres, *Hb. Potts*. Glascoed Bridge and Dingle, 1868, *Hb. Jones*. Llandrillo-yn-Rhos, 1868, *Hb. Harris*. Near Llangollen. Llandegla neighbourhood.

Cystopteris fragilis Bernh. Castel Dinas Bran and Glan-yr-afon, near Mold, *Hb. Potts* (= β *dentata* Hook.). Rocks by the stream above Diffwys. Nant-y-garth. In the neighbourhood of Llanarmon Mynydd Mawr.

Lastræa montana T. Moore. Llansilin, 1867, *Hb. Jones*.

Phegopteris Robertiana Braun. Known in two localities, both on limestone.

P. polypodioides Fée. Obtained by Miss Jones in the southern portion of the county in 1866. Should occur elsewhere.

Osmunda regalis L. There are two old records, but it is doubtful if this now occurs in Denbighshire.

Ophioglossum vulgatum L. Meadow near the stone bridge over the Elwy at the end of Cefn rocks, and on the Cefn side of the river, *Fl. B.* In a field between the Alyn and the railway, near Marford, 1910, *Miss E. M. Porter* sp. Slope of Moel Famma, above Llanferres, 1910, *A. Newstead.*

Botrychium Lunaria Sw. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Carreg Wyn [? Wen], Llanferres, *Hb. Potts.* Chirk Castle, 1863, *Osw. F. C.*

Equisetum maximum Lam. On the way to Craig-y-glyn, near Llanrhaiadr-yn-Mochnant, 1858, *Osw. F. C.* Near Rhwng-y-creigiau, Llanrhaiadr-yn-Mochnant, *Hancock.* Gresford, 1871, *Hb. Harris.* Llysfaen, *Russell.* Marshy places, Marchwiel, *Drinkwater.* In the woodland adjoining "Lady Bagot's Drive" between Pont uchel and Rhewl. Swampy ground in Gresford Woods.

E. sylvaticum L. Sparingly by roadside, one and a quarter miles or so south-west of Clawdd Newydd, not far from Ffynnon Sarah. By laneside going towards Nantglyn from Cyffylliog, and about one-third of a mile or so south of Tai-isaf, near a small stream which runs into the Afon Concwest.

E. limosum L. Moelfre Pool, 1868, *Hb. Jones.* Still there, 1910. Llandrillo-yn-Rhos, *Russell.*

Lycopodium Selago L. Craig Berwyn, 1863, *Hb. Jones.* Llangollen, July 4, 1887 (*Miss E. M. Wood*), *Hb. Day.* On Pincyn Llus, above Cyffylliog; very local and easily overlooked.

L. clavatum L. Near Llangollen, 1859, *Osw. F. C.*; 1861, *Hb. Harris.*

**L. alpinum* L. Near Llangollen, 1859, *Osw. F. C.*; 1887 (*Miss E. M. Wood*), *Hb. Day.* Craig Berwyn, 1867, *Hb. Jones.* Moelfre uchaf, in company with *Saxifraga stellaris*, *Russell.* North-west of Llyn Llyncaws, at 2200 ft. and higher.

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A LIST OF
BRITISH ROSES.

BY

MAJOR A. H. WOLLEY-DOD.

As I shall be leaving England this autumn to reside abroad at least for the greater portion of the next two years, I must reluctantly drop the study of Roses, though I hope the cessation will only be temporary.

My regret at this step is the greater, since I have made very little progress in my knowledge of the genus during the past two years, partly on account of my own indisposition, but chiefly owing to Prof. Dingler having been compelled through ill-health to lay aside his work on the Roses of Europe, so that, with the exception of a few of the *Stylosa* group, the whole of my collections of the last two years has been returned by him unnamed. I had postponed further study of the genus in anticipation of his assistance; but as that has unfortunately not been forthcoming, I must present the British list in a lame and uncertain fashion; indeed I should have made no advance in the genus but for the kind assistance of M. Sudre, who has seen all my own specimens of the past two years.

In this paper I propose to give a revised list of the British Roses, including all the names I have received from Prof. Dingler and M. Sudre, with a few brief remarks on them, indicating by the use of square brackets those names which seem to me to be undesirable for retention at present, owing to their introduction having been based on insufficient material, or because the characters of the specimen referred to them appear to me to be too much opposed to their descriptions. I have added a reference to the author's description in the case of those species which will probably have to be retained, but for the sake of brevity I have not given the descriptions themselves. I have also indicated the vice-counties in which the specimens which I have myself seen have been collected, and have included a certain number from the herbaria of others, which have been sent to me for naming; but on none of these have I had an opportunity of obtaining the opinion of either of the two above-mentioned authors. In cases of more than ordinary doubt, a query follows the vice-comital number. In cases where I have no record of the vice-county, I have named the whole county.

It will readily be seen, both from these introductory remarks, and from the notes following each species or variety, that we are very far from finality as to our British Rose list, while the distribution is so imperfectly known that it is at present quite misleading. Time has not permitted me to re-examine the specimens in our national herbaria with a view to bringing them into line with the present list, nor to prepare dichotomous keys to the groups and subgroups.

My impression gains strength that the subdivision into groups, perhaps even into sections, is too artificial. It is difficult to believe that a few scattered hairs on the midribs, or the presence of a few denticles on some of the main teeth, or a little difference in the pinnation of the sepals, and all such characters can throw such similar-looking plants into different groups or subgroups as they do, yet if one disregards such characters, it is not easy to see what written ones could be substituted, however different the aspect of the specimens may be. Doubtless when one gets to know most of the species and varieties at sight, it will be easier to group them than at present, reserving slight differences, even in organs which have hitherto been regarded as important, to mark the varieties only. Thus, for example, *R. semiglabra* Rip. might be regarded either as a less hairy variety of *R. dumetorum* Thuill., or as a slightly hairy one of *R. lutetiana* Lém.

But our great difficulty is, first, that according to foreign experts the British Roses are much more variable in their characteristics, that is to say, less capable of segregation than the continental ones; and, secondly, that while the older descriptions are too comprehensive from their indefiniteness, many modern ones are far too diffuse, and the impression is irresistible that they are those of individuals rather than of associations such as we are accustomed to call species. Even some of the descriptions of Crépin, who strongly deprecated over-splitting, are subject to this criticism. It is hardly an exaggeration to say that no two bushes are alike; certainly it would be very difficult indeed to find two in which all the minute descriptions of such very unimportant organs as the stipules, auricles and bracts, quite agree; while even the more important ones, such as shape and size of prickles, leaflets and fruit, may vary considerably, even on the same bush.

It must not be supposed, however, that I am advocating a return to our old system of keeping up a relatively few names. There may be only a few species, but there are certainly a large number of forms as well worthy of distinction as many so-called species, and I still think that the solution may lie in the creation of perhaps quite a considerable number of new names, but as varieties or forms, not as species. The trouble at present is that it is no exaggeration to say that not ten per cent. of our specimens agree exactly with the published descriptions, but are equally near, or remote from, two or more. Even those placed to the same variety by botanists who have studied Roses specially for many years differ startlingly in appearance and in technical characters. Though the unravelling of the tangle will be a difficult business, it is one which should not be shirked by British botanists.

I have made no attempt to revise nomenclature. The name of each group or subgroup is, as a rule, that of or derived from that of its most important member, but it must not be supposed that all the other members have equal rank. I have given the names as I find them, without prejudice to revision, either of nomenclature or grouping, at some future date, and have refrained for the present from making more than an occasional expression of opinion as to their relative rank. It is of course anomalous, for example, that such a name as *R. tomentosa* var. *uncinata* Lees should appear in the group *Omissa*, but if I alter it to *R. omissa* var. *uncinata* W.-Dod, there is not only no probability of finality, but an extreme improbability thereof, so that another combination would have been unnecessarily added to the nomenclature.

I have made frequent references to my two former papers in this Journal, *viz.* "The Subsection *Eu-caninæ*" and "The British Roses," published as Supplements in 1908 and 1910 respectively. For the sake of brevity I have cited these as "E." and "B. R."

I have now fulfilled my promise to deposit such duplicates as I have, with notes on some of them, in the British Museum Herbarium at South Kensington. It is much to be hoped that these will be added to by other botanists, but I would suggest that discretion be exercised, and only such examples be deposited as can be more or less definitely named. A heterogeneous collection, either unnamed, or with very doubtful names, is more confusing than none at all, unless fully annotated as to differences from type. I must, however, plead guilty to some degree of uncertainty attaching to almost all my names up to the present, but the specimens at least represent the interpretation I place upon the species and varieties up to the time of depositing them.

SECTION SYNSTYLÆ.

GROUP ARVENSIS.

ROSA ARVENSIS Huds. Fl. Angl. p. 192. Unmistakable, at least as an aggregate, but I have definite records only from v.-c. 13, 16, 17, 32, 55, and 58.

[*R. dibracteata* Bast. in DC. & Lam. Fl. Fr. v. p. 537. I can throw no further light on this species, and think it should be excluded from our list. All the large strong-growing forms originally referred to it may equally well be placed to var. *major* Coste.]

R. ARVENSIS var. MAJOR Coste in Pons & Coste, Annot. Herb. Ros. iii. p. 14. To this variety must, I suspect, be referred, as just stated, all the material formerly labelled *R. dibracteata* Bast., which is regarded by many continental botanists as a hybrid. Such forms are quite frequent and general. V.-c. 2, 3, 13 or 14, 17, 62.

R. OVATA Lej. Fl. Spa, p. 312. Strictly speaking, this covers the narrow-leafleted as well as the narrow-fruited forms, both of the type and of var. *major*, but the name has been applied chiefly to those with narrow fruit. It appears frequent, and merges into the type. An example in my herbarium from S. Devon might equally well be referred to var. *major* or to *R. ovata*; I have placed it to the former. V.-c. 3 or 4, 9, 17, 36, 37, 62 or 65.

R. ARVENSIS var. SCABRA Baker ex Gandog. Dec. Pl. Nov. i. p. 26. A very slight variety, distinguished by its very glandular petioles, and probably generally distributed. V.-c. 13, 34.

R. ARVENSIS var. BISERRATA Crép. in Bull. Ac. Roy. Belg. p. 113. Decidedly biserrate leaflets, such as this variety should have, appear to be very rare in *R. arvensis*, though a fine, almost obsolete denticulation of the primary teeth is common enough. I have seen no specimens except W. R. Linton's. V.-c. 57.

R. ERRONEA Rip. Though the glandular setæ on the peduncles are more or less deciduous, so that late in the season a certain number of smooth peduncles can be found, extreme forms appear to be quite rare. V.-c. 17, 18 or 19 ?, 62 or 65 ?.

R. MELVINI Towndr. ex N. E. Brown, Suppt. E. B. 3, p. 162. Omitted by an oversight from my B. R. I have seen no specimens except those from Madresfield. V.-c. 37.

R. GALLICOIDES Déségl. Cat. Rais. p. 49. I have seen no further specimens of this beyond those mentioned in B. R., pp. 6, 7. V.-c. 37, 38, 57.

R. ARVENSIS × STYLOSA. Specimens distributed through the Watson Exchange Club by Messrs. Bickham and Towndrow are referred to this hybrid, no doubt correctly. It may be one of the elements which make up Bastard's *R. dibracteata*.

SECTION STYLOSÆ.

GROUP STYLOSA.

R. STYLOSA Desv. in Journ. de Bot. 1809, ii. p. 317 (including vars. *Desvauxii* Baker and *Desvauxiana* Ser. as synonyms). Though continental botanists sometimes apply this name to forms with leaflets as little hairy as in *R. systyla* Bast., though broader, it seems to me, in view of Desvaux's own specimens and description, that considerable hairiness should be a more important feature than breadth of leaflets. It is for this reason that I excluded the Surrey, E. Kent, and S. Devon specimens cited in B. R. p. 11, and I have seen no further specimens than those mentioned therein, *viz.* from v.-c. 8, 9, 11, and 31.

R. STYLOSA var. CORYMBOSA Desv. in Journ. de Bot. 1813, ii. p. 113 (var. *opaca* Baker). No further specimens have been referred to this by Sudre or Dingler, but it is possible that specimens from Exeter (*Hunnybun*), and W. Sussex (*Roffey*), may belong here. They have smooth peduncles, but their general appearance is that of *R. systyla* rather than *R. stylosa*. They are not *R. virginea*, and I do not know how otherwise to name them. V.-c. 3 ?, 13, 14.

R. SYSTYLA Bast. Ess. Fl. Maine et Loire Suppl. p. 31. As a rule this species is quite unmistakable, but when out of flower it may be mistaken for the true *R. leucochroa* Desv. V.-c. 1, 2, 3, 6, 11, 13, 15, 16, 17, 18, 21, 22, 23, 24, 31, 32, 34, 35, and probably in most of the intermediate vice-counties.

R. SYSTYLA var. LANCEOLATA Lindl. Monog. Ros. p. 111. A specimen from Pebblecombe, Surrey, with a peculiar aspect from its small, rather lanceolate leaflets, has been referred here by Sudre. V.-c. 17, and Ireland.

R. LEUCOCHROA Desv. in Journ. de Bot. 1809, ii. p. 316. Since writing my notes in B. R. pp. 13–15, I have received Prof. Dingler's remarks on my specimens. Taken in conjunction with those of Mr. Rogers and M. Sudre, they show how experts differ in this critical genus. It may be of interest to give an epitome of their opinions.

MY NO.	ROGERS.	SUDRE.	DINGLER.
1772 (towards group *Deseglisei*).	A *canina* form.	*R. systyla.*	Outside the group *Stylosa*, though near it.
1780 (towards *systyla*).	A *stylosa* form, but not *leucochroa.*	*R. leucochroa* if petals white.	Nearest *R. leucochroa.*
1782 (apparently the commonest form).	A *canina* form.	*R. rusticana.*	Between *canina* and *dumetorum.*
1787 A.	Just my idea of *leucochroa.*	*R. systyla.*	Outside the group though near it.
1791.	*R. leucochroa.*	*R. systyla.*	Nearer *Deseglisei* than *systyla.*
1819.	No remark.	*R. rusticana.*	Between *canina* and *dumetorum.*
1820.	,, ,,	,, ,,	,, ,, ,,
1821.	Nearer *obtusifolia* than any *stylosa.*	*R. stylosa* var. *microphylla* Rouy.	A possible but not a certain *stylosa.*

The above specimens were all gathered in S. Devon, and were intended to cover the various forms of what I supposed to be *R. leucochroa.* I have again examined Déséglise's series at South Kensington, as well as the British examples, and am confirmed in my opinion that there are two plants involved. The true *R. leucochroa* Desv. is simply a white-flowered *R. systyla* Bast., in which the style-column is sometimes, not always, short. This form seems common on the Continent, but rare in Britain, where it has been gathered in S. Devon by Archer Briggs and by Mr. Savery. The British plant usually so called also occurs on the Continent, but more rarely, and as regards styles, shortness of peduncles, breadth of bracts, size and shape of prickles, and size of leaflets, is quite as near the *Eu-caninæ* as the *Stylosæ* section. There are certainly differences between my specimens, but I must confess my inability to see from them or from the other specimens studied where group *Stylosa* ends and section *Eu-caninæ* begins. The connecting-link is to be found in *R. incerta* Déségl., one of the *dumetorum* group, to which my 1782 probably and 1772 and 1821 possibly belong. V.-c. for the British plant, 1, 2, 3, 4, 5 (or 6 ?), 9, 11 (fide *Rogers*); for Desvaux' plant, 3, 15, 17.

R. STYLOSA var. PSEUDO-RUSTICANA Crép. in Journ. Bot. 1889, p. 24. This well-marked variety, which is quite worthy of specific rank, still appears to be restricted to the four vice-counties quoted. A specimen from S. Devon is considered by Sudre and Dingler to be near *R. rusticana* Déségl., but both those authorities admit that they do not know Crépin's variety. V.-c. 3, 5, 8, and 9.

R. VIRGINEA Rip. ex Déséglise in Journ. Bot. 1874, p. 167. My two gatherings from S. Devon, referred to in B. R. p. 16, have been confirmed by Dingler, and I have seen a specimen from E. Sussex (*Roffey*) which almost certainly belongs here. V.-c. 3, 14.

R. STYLOSA var. EVANIDA Chr. in Bot. Exch. Club Rept. 1879, p. 12. Last summer I found quite a considerable number of bushes of this variety on Ham Common, so it is in no danger of extinction, as I feared. It diverges almost as widely from the type as does our usual form of *R. leucochroa*, and is more worthy of specific rank than what I take to be the true species of Desvaux. (See remarks under *R. litigiosa* Crép.) V.-c. 17.

R. GARROUTEI Pug. & Rip. in Bull. Soc. Dauph. p. 68. This name has been given by Sudre to one of Mr. Hunnybun's Hunts specimens. It has all the characteristics of *R. systyla*, but has glabrous slightly biserrate leaflets, and the peduncles are almost smooth. I have not seen the original description, but the specimens agree well with that given in Rouy's key, so the name might stand in our list, at least provisionally. It is possible that a specimen from W. Gloster (*Bucknall*), which is referred later to *R. chlorantha* Sauz. & Maill., also belongs here. V.-c. 31, 34 ?.

[*R. stylosa* var. *microphylla* Rouy, Fl. Fr. vi. 284. M. Sudre applied this name to one of my specimens of supposed *R. leucochroa* from S. Devon, no. 1821. It is in some respects near var. *evanida*, and Mr. Rogers thought it nearer *R. obtusifolia*, so I have excluded it.]

R. PARVULA Sauz. & Maill. Fl. Deux Sévres, p. 223. I distributed specimens through the Bot. Exch. Club in 1909 labelled *R. seposita* Déségl., though Sudre thought it to be near *R. parvula*. Dingler has since expressed the same opinion, so it had better be so labelled. Its habit is peculiar from its very numerous, long, almost unarmed, very floriferous branches. Its leaflets are biserrate, slightly hairy beneath, peduncles smooth and styles almost glabrous. V.-c. 17.

SECTION PIMPINELLIFOLIÆ.

GROUP SPINOSISSIMA.

R. SPINOSISSIMA Linn. Sp. Pl. p. 491. V.-c. Sussex, 15, 17, 38, 41, 80; Perth, 96.

R. PIMPINELLIFOLIA Linn. Syst. Nat. 4, p. 1062. There is much less variation in this group than in most of those of other sections, perhaps because we have fewer individuals to deal with. It will not, therefore, be inconsistent with the treatment of the other groups if we regard *R. pimpinellifolia* merely as a smooth-peduncled variety of *R. spinosissima*, though both type and variety present among themselves differences in stem armature and in foliage. V.-c. 3, 9, 10, 16, 17, 22, 58, 65, 66, 96; Channel Islands.

R. PIMPINELLIFOLIA var. ROSEA Koch, Syn. 3, p. 194. This is, I think, the correct name for the form with rose-coloured flowers from W. Kent, which has also been gathered at Llandudno. V.-c. 16, 49.

R. CIPHIANA Sibbald, Scotia Ill. ii. p. 46. The true plant of Sibbald, referred to in B. R. p. 22, has flowers variegated with deep or pale rose and white, not uniformly rose. So far as I know, it has only been gathered in Perthshire. The plant usually met with in cultivation under this name, having uniformly rose flowers, should be referred to the preceding. V.-c. Perth.

R. RIPARTII Déségl. Ess. Monogr. p. 47. I have seen no further specimens of this, nor have I been able to find it on Barnes Common, where the type is plentiful enough. As in *R. arvensis*, the leaflets sometimes have a fine denticle or two on a few of the teeth, not amounting to biserration, and without the glandular development on the petioles and midribs. V.-c. 17.

R. MITISSIMA Gmel. Fl. Bad. Alsat. p. 358. V.-c. 42, 49.

R. RUBELLA Sm. E. B. t. 2521. I am still unable to dissociate the red-fruited forms of *R. spinosissima* from *pimpinellifolia* × *alpina*, which is the continental interpretation of Smith's plant, though of course extremes are widely different. The British form I believe to be the former, though it presents other distinguishing features besides the fruit (see B. R. pp. 24, 25). V.-c. 66; also near the Forth Bridge (*Pickard*), county not stated.

SECTION PIMPINELLIFOLIÆ HYBRIDÆ.

The difficulty of segregating the individuals of this section into groups corresponding with those of their parents is very great. In very many cases the examination of dried specimens does not reveal their parentage, and even when growing it can, in many cases, only be guessed at. Nor is intentional crossing and cultivation likely to throw much light on the question. If it be admitted, as I think it must be, that all our groups run into one or more others, and present an almost interminable array of species, varieties, and forms, it will readily be seen how very much larger a series must result from their hybridization, not only on account of the large possible number of combinations, but also from the inevitable variation resulting from their interbreeding. The following account, therefore, is a very imperfect one.

GROUP PIMPINELLIFOLIÆ × VILLOSÆ.

There is no doubt that *R. involuta* Sm. has been treated as a very large aggregate, and has been made to include hybrids with the subsections *Eu-caninæ* (*R. hibernica* Templ.) and *Rubiginosæ*, besides those with the *Villosæ*, of which latter hybrids it has of recent years been held to be the type (agg.).

R. SPINOSISSIMA (agg.) × MOLLIS. I have seen specimens which should probably be referred to this parentage from v.-c. 79, 89, 92, 94, and 108.

R. SPINOSISSIMA (agg.) × TOMENTOSA (agg.). It is probable that most of the succeeding forms belong to this hybrid or to *R. spinosissima* (agg.) × *omissa* (agg.), of one of which they should be regarded as varieties only, certainly not as species; but, as already stated, it contains an admixture of *R. spinosissima* (agg.) × *mollis*, at least under the first three names.

R. INVOLUTA Sm. Fl. Brit. p. 1398 (var. *Smithii* Baker, Monogr. p. 207). Specimens in Mr. Druce's herbarium from Arran and Derby, and Mr. Marshall's from E. Kent, may, I think, be referred here, but it is difficult to separate it from one or two of the other segregates. V.-c. 15, 57, 100.

R. SABINI Woods in Trans. Linn. Soc. xii. p. 188. This runs so completely into *R. Doniana* that I think it is best to regard them as synonymous, though extreme forms might be segregated. V.-c. for seg. 62, 83; for agg. 38, 58, 64, 65, 82, 90, 96, 106, 108, E. Mayo, Antrim.

[*R. Doniana* Woods in Trans. Linn. Soc. xii. p. 185. Included in the above; also, as a segregate, from v.-c. 13, 83.]

R. GRACILIS Woods in Trans. Linn. Soc. xii. p. 186. I have seen no further specimens referable to this or to the remaining segregates of the group, except *R. Wilsoni*, and can, therefore, only quote the vice-counties given in B. R. pp. 33–40. V.-c. 17? (distributed as var. *Robertsoni*), 21, 62, 70.

R. INVOLUTA var. ROBERTSONI Baker (Monogr. p. 206). V.-c. 62, 66, or 67, Derry.

R. INVOLUTA var. GRACILESCENS Baker (*l. c.*). V.-c. Antrim.

R. INVOLUTA var. OCCIDENTALIS Baker (*l. c.* p. 207). Ireland.

R. WILSONI Borr. in Hook. Brit. Fl. ed. 3, p. 231. As stated in B. R. p. 47, I include in this *R. hibernica* var. *cordifolia* Baker. Some of S. A. Stewart's specimens from Knockagh, labelled *R. involuta*, are very near this. V.-c. 44, 68, Derry.

GROUP PIMPINELLIFOLIÆ × EU-CANINÆ.

R. SPINOSISSIMA (agg.) × CANINA (agg.) (perhaps including *spinosissima* (agg.) × *glauca* (agg.)). This covers *R. hibernica* var. *glabra* Baker (Rev. Brit. Ros. p. 21) and var. *Grovesii* Baker (Rep. Bot Exch. Club, 1876, p. 15), which may arise from different parents of the *canina* group, but which it seems hardly desirable to retain as distinct varieties. Var. *glabra* is recorded from v.-c. 17, 58, 62 or 65, 66, 70, 94, 107; and var. *Grovesii* from 17 and Antrim.

A biserrate form from Alnwick, v.-c. 68, and a form near *R. Schultzii* Rip. from Derry, both mentioned in B. R. p. 47, belong to this hybrid; the former must arise from a *dumalis* parentage.

R. SPINOSISSIMA (agg.) × DUMETORUM (agg.) (*R. hibernica* Templ. in Trans. Dub. Soc. 2, iii. pp. 62–64) is the best known representative of this group. V.-c. 58, 65, 70, Derry, and Down.

R. INVOLUTA var. LÆVIGATA Baker, Monogr. p. 107. V.-c. 64 or 65, and Derry.

[*R. involuta* var. *Webbii* Baker in Journ. Bot. 1874, p. 338. Mr. Barclay informs me that the Lothian specimen mentioned by me in B. R. p. 44 is from the same bush as that from which Sadler gathered his specimen of var. *lævigata* (*id.* p. 37). Apart from this, I do not think that the two varieties can be separated. V.-c. 58, 83.]

Another form of *R. spinosissima* (agg.) × *dumetorum* (agg.), near the continental *R. sabauda* Rap., was gathered by Webster in Durham. V.-c. 66.

Hybrids between *R. spinosissima* (agg.) and *R. coriifolia* (agg.) no doubt occur, and might easily be mistaken for *R. spinosissima* (agg.) × *dumetorum* (agg.). Mr. Barclay thinks bushes found by him in Haddington and Banff (v.-c. 82 and 94) belong here. It is difficult either to controvert or confirm this opinion.

R. SPINOSISSIMA (agg.) × DUMETORUM (agg.) (or CORIIFOLIA? (agg.)) f. MARGERISONI f. nov. Reluctant though I have been to name any new form, especially one of which the parentage is doubtful, I think this form is sufficiently distinct to deserve a name, and its finder tells me there are several bushes. Stem erect, 2–3 ft. high, often reddish; prickles very numerous, of all lengths, all subulate, mostly declining, often strongly so, or falcate, much fewer and weaker or none on flowering shoots; leaflets 7–9, dull glaucous green, much paler beneath, turning deep reddish in autumn, oval or broadly so, obtuse, rarely subacute or cuspidate, rounded at base, the terminal 12–15 lines long by 8–10 wide, very thinly pilose or pubescent above, more densely so but still thinly beneath, eglandular except for some very small glands towards the base of the midrib; toothing mostly entire, teeth broad-based, acuminate; petioles reddish, densely puberulent, with a few, sometimes very few, glands, unarmed or with a few unequal pricklets; stipules with long, narrow, lanceolate auricles, thinly hairy or subglabrous on back, densely glandular-ciliate; peduncles solitary, 4–6 lines long, smooth; petals pale pink; sepals long, narrow, entire, smooth on back, loosely reflexed after fall of petals, erect or connivent in fruit; fruit smooth, depresso-globose, orange-red, 3½ lines in diameter; styles in a dense woolly head. Its numerous very *spinosissima*-like prickles, and a much closer resemblance to that parent than to any of the *Eu-caninæ*, are its most pronounced features. It was discovered by Mr. Margerison in Knipe Wood, near Kettlewell, N.W. Yorkshire, v.-c. 65.

GROUP PIMPINELLIFOLIÆ × RUBIGINOSÆ.

R. SPINOSISSIMA (agg.) × EGLANTERIA (agg.) (*R. biturigensis* Bor. Fl. du Centre, 3, ii. p. 220). I have seen well-marked specimens of this hybrid from E. Kent, and very similar ones, but with leaflets much less glandular beneath, from E. Perth and Haddington, collected by Mr. Barclay. They differ from *R. biturigensis* chiefly in their glandular peduncles and fruit. V.-c. 15, 82, 89.

R. INVOLUTA var. NICHOLSONII Crép. in Bull. Soc. Bot. Belg. xxi. p. 119. Besides the type specimen formerly in the herbarium of Edinburgh University, but now, I fear, lost, I think a gathering by Mr. Barclay from near Auchterarder, Mid-Perth, is best referred here on account of its very large and numerous subfoliar glands. Both the collector and M. Sudre, however, think it a *spinosissima* × *tomentosa* form. A specimen from Westerness (*Druce*) also is best referred here. V.-c. 88 ?, 91, 97.

R. INVOLUTA var. MOOREI Baker (Monogr. Brit. Ros. p. 207). V.-c. 96, Derry.

SECTION CANINÆ.

SUBSECTION EU-CANINÆ.

GROUP CANINA.

SUBGROUP LUTETIANÆ.

I can add but little to my general remarks (B. R. pp. 131–134) on this subgroup of the subsection *Eu-caninæ*, so will confine myself to an enumeration of the names which have been applied to my recent specimens, with a few notes on each. I have subdivided the subgroup into those with large, medium, and small leaflets respectively, which, though not at all satisfactory, has the effect of bringing similar-looking plants together better than any other. Large leaflets are 14 lines long or more, medium are 10 to 14, and small under 10, but these figures are of course only approximate.

LEAFLETS LARGE.

R. LUTETIANA Lém. in Bull. Soc. Phil. de Paris, p. 95. There seems to be a strong disposition on the part of Sudre and Dingler to refer specimens to any of the closely allied segregates rather than to the type, and, indeed, it is a question whether it is not better to use this and most of these old names in an aggregate sense only. I have but a single specimen placed to this species by Dingler, and that only as "a form," while Sudre believes it to be *R. insignis*, for which it seems too uniformly serrate. This specimen is from Surrey, and I have seen a few others which I think must go here, but they have not been verified. If a segregate be kept up at all, it should be one which possesses no striking features beyond those of the subgroup—that is, its leaflets should be large, uniserrate, and glabrous, petioles smooth and almost or quite eglandular, peduncles smooth, fruit ovoid, neither globose nor much elongate, and styles hispid, neither villous nor glabrous. Any departure from these characteristics at once removes the specimen to a different variety, species, or even group. V.-c. 13, 17, 20, 36, 55, 62, 65, 70.

[*R. canina* var. *nitens* Desv. Journ. de Bot. ii. p. 114. This is merely a shining-leaved form. A specimen from Surrey was placed here by Sudre, but I prefer Dingler's opinion that it is only a form of *R. sphærica*.]

R. CANINA var. GLAUCESCENS Desv. *l. c.* This differs from the type in its hairy petioles, as well as its glaucous foliage. Sudre thought a Cheshire specimen ought to be referred here, but Dingler thought it was *R. separabilis*. On the whole, I think Sudre is right. I have not seen it from other vice-counties. V.-c. 58.

R. FALLENS Déségl. Cat. Rais. p. 149. This is very near the last, but has not glaucous leaflets. V.-c. 17, 36, 55, 58 ?.

R. SPHÆRICA Gren. in Arch. Fl. Fr. & All. p. 333. If one may judge from the number of individuals, this is quite the commonest of the large-leafleted forms of the group. The globose fruit is its best distinction, but its petioles are often villous, making it near *R. fallens* or var. *glaucescens*. Dingler admits some quite small-leafleted forms into the species, but I think, with Sudre, that they are better placed under *R. aciphylla* or *R. senticosa*. Sudre has applied the name *R. canina* var. *chloophylla*, as a new varietal one, to a Cheshire form with very large, shallowly but widely serrate leaflets. Dingler also thought it to be a new form, though it hardly differs from the type in other respects. I do not think Sudre has published it, so I merely mention it here. V.-c. Cornwall, 14, 17, 36, 58.

LEAFLETS MEDIUM.

R. SEPARABILIS Déségl. in Bull. Soc. Bot. Belg. xix. p. 30. This is quite the commonest form in the subgroup, at least in Surrey and Cheshire, and may be regarded as a small-leafleted form of *R. lutetiana*. The combination of leaflets narrowed at both ends, often deeply and coarsely toothed, hispid styles, ovoid fruit, and rose flowers will distinguish it from its close allies. Déséglise lays great stress on the remarkable absence of prickles, but if Sudre and Dingler are to be trusted, they are by no means always very few. V.-c. 17, 32, 58.

R. NEMOPHILA Déségl. & Ozan. in Bull. Soc. Dauph. no. 3283. Medium leaflets, rounded or not much narrowed at the base, and acute, or at any rate not very acuminate apex, styles always in a projecting fascicle like those of a *Stylosa*, and usually glabrous or only thinly hispid, mark this species. The disc is said to be very conical, but this is not always the case, and the fruit appears to be more often globose than ovoid. V.-c. 3, 14, 17, 31?.

R. FLEXIBILIS Déségl. Cat. Rais. p. 148. This has medium leaflets, which in typical forms are rounded or shortly acuminate at the apex and narrowed at the base, though often they are just as those of *R. separabilis*, also ovoid fruit, glabrous styles, and white flowers. It runs very near *R. separabilis*, and without a knowledge of the colour of the flowers Sudre is sometimes doubtful which it is. V.-c. 3, 13?, 14?, 17, 36, 62.

LEAFLETS SMALL.

R. SENTICOSA Ach. in Köngl. Vetensk. Akad. Handl. p. 91. I can add but little to my remarks in E. p. 30, but am inclined to agree with Dingler that we have this species or something very near it in Britain. Its small leaflets, rounded at the base, usually villous petioles, and ovoid fruit, seem to be the best points by which it can be distinguished from *R. aciphylla*, but possibly it would be more satisfactory to unite them. I think it is frequent, and I have it from v.-c. 16, 17, 22, 34, 35, 36, 58, 62.

[*R. aciphylla* Rau. Enum. Ros. p. 69. Sudre uses this name pretty freely; I have ten gatherings so named by him, three of which Dingler refers to *R. sphærica*, though they seem to me much too small-leaved, two to *R. senticosa*, one to *R. mucronulata*, and one between *R. senticosa* and *R. aciphylla*, while three he has not seen. I think most of these are better placed under *R. senticosa*, from which *R. aciphylla* differs in narrower leaflets, more like those of *R. agrestis*, and more globose fruit. Crépin says specimens of Rau's own gathering are biserrate, and the description says "irregularly serrate." If this is so, none of my specimens are correctly named, and continental botanists have got a wrong idea of the species. *R. oxyphylla* Rip. (Déségl. Cat. Rais. p. 147) is very near *R. aciphylla*, but with ovoid fruit and quite simply serrate leaflets. Specimens from Cheshire and Surrey may be correctly referred to it, but the name has not been confirmed. I have put all my other gatherings provisionally into the *R. senticosa* cover.]

R. MUCRONULATA Déségl. in God. Fl. Jur. Suppl p. 71. This differs from *R. senticosa* mainly in its glabrous styles. Its leaflets are perhaps a little broader and more cuspidate. It appears rare, but I have specimens which I think may be referred here from v.-c. 15, 17, 36, 58, 65. The Thirsk specimen (E. p. 35) I think comes better under *R. senticosa*.

R. AMANSII Déségl. & Rip. in Journ. Bot. 1874, p. 169. This may be regarded as a white-flowered, globose-fruited form of

R. senticosa, usually with hairy petioles. I have seen a specimen from some British station in Déséglise's herbarium, but it was named with doubt and was hardly in nameable condition. More recently Sudre has so named two Surrey specimens for me, one of which Dingler confirms, but he has not seen the other. Sudre also places here a S. Devon specimen, with very woolly styles, which looks to me much more like *R. syntrichostyla*, but for its quite uniformly serrate leaflets. V.-c. 3 ?, 17.

SUBGROUP TRANSITORIÆ.

This subgroup covers all those forms which are not uniformly serrate enough for the *Lutetianæ*, yet can hardly be classified as biserrate. The biserration is, as a rule, confined to the lower leaves of the flowering shoots, and it may be very slight even there. The subdivision into those with leaflets large, medium, and small is, I fear, just as unsatisfactory as in the *Lutetianæ*, but it is the best I can suggest.

Leaflets Large.

R. INSIGNIS Déségl. et Rip. in Mém. Soc. Ac. Maine et Loire, xxvii. p. 112. This is the counterpart of *R. lutetiana* in this subgroup. Specimens referred to it are sometimes not more irregularly serrate than in *R. lutetiana*, but its petioles are usually more glandular, its peduncles shorter, and fruit longer, with the sepals often spreading, which causes it sometimes to be mistaken for a member of the *Glauca* group, especially as its leaflets are very often glaucous. It is, I think, common. V.-c. 3, 17, 24, 31 ?, 32, 36, 55 ?, 58, 59.

R. GLOBULARIS Franch. in. Bor. Fl. Centr. Fr. ed. 3, p. 221. Generally similar to the last, but usually a lower-growing bush, with subglobose or at least broadly ovoid fruit and broader leaflets. V.-c. 3, 5, 13, 14, 17, 32, 34, 58.

[*R. oleronensis* Rouy, Fl. Fr. vi. p. 312. This is the name given by Sudre to a S. Devon specimen. I know the variety only from Rouy's key, where it is credited with glabrous styles and ellipsoid fruit, which my specimen does not present. It seems quite at home under *R. sphærica* Gren., where I have placed it.]

Leaflets Medium.

R. RHYNCHOCARPA Rip. in Déségl. Cat. Rais. p. 162. Characterized mainly by the narrow elongate fruit, which is also much narrowed at the apex below the disc. Its styles are usually subglabrous. Ripart thought it a form of *R. dumalis*, but his own specimens being almost uniserrate, it cannot go further than the present subgroup. Its leaflets vary from medium to small. Three of my four gatherings are from Breconshire. V.-c. 17, 42.

[*R. analoga* Déségl. in Bull. Soc. Bot. Belg. xix. p. 32. Two specimens, one from Cheshire and one from Surrey, have been referred to this by Sudre, the former with much doubt, while the

Surrey specimen looks very remote from the description. It appears to be very near var. *ramosissima*, to which the Surrey example might certainly be referred. The Cheshire specimen is perhaps best placed under *R. viridicata* Pug.]

Leaflets Small.

R. canina var. ramosissima Rau. Enum. Ros. p. 74. I have three or four specimens so named by Sudre, but Dingler gives various other names to those he has seen. I think, however, that we have the variety in Britain. Its leading features are its numerous short, unarmed, or nearly unarmed, flowering branches, rather small leaflets, ovoid fruit, and rather long, very thinly hispid styles. It seems frequent, in Surrey at any rate, but my Cheshire specimens, placed here by Sudre, belong rather to *R. sphærica* or *R. globularis*. It is not easily separated from *R. curticola* Pug. V.-c 3 ?, 17.

[*R. horridula* Déségl. Cat. Rais. p. 154. This is described as an irregularly toothed form of *R. aciphylla*, with densely prickly stem. Sudre uses the name for three or four Surrey specimens, which, however, do not seem to agree at all with the description. I do not propose to retain the name.]

R. syntrichostyla Rip. ex Déségl. Cat. Rais. p. 143. Small or medium, very slightly biserrate leaflets, white flowers, and densely villous, usually prominent styles characterize this species. In addition to those cited in E. p. 33, I have collected two examples in Surrey, which I think must be referred here. Sudre confirms one of them, but objects to the other on account of its small leaflets, being misled by Rouy's key, which wrongly describes them as large. V.-c. 2, 3, 17.

R. curticola Pug. in Mém. Soc. Ac. Maine et Loire, xxviii. p. 114. Several Surrey plants with small leaflets, more fully biserrate than is usual in the subgroup, prickly flowering branches, white flowers, and long glabrous styles, are placed to this species by Sudre. Dingler has only seen one of them, which he thinks nearer *R. oblonga* Rip., but I think it may go here with the others. V.-c. 14, 17.

SUBGROUP DUMALES.

Apparently the largest of the subgroups of the group *canina*, at least in England, and containing a number of forms varying considerably in biserration, making their reference to this or to the preceding subgroup a question of some difficulty.

Leaflets Large.

R. dumalis Bechst. in Forstbot. p. 227. I find a somewhat heterogeneous collection under this name as understood by Sudre. Dingler has only seen two of them, one of which he confirms as a form, and the other he refers to var. *Schlimperti* Hofm. It is difficult to generalize the characteristics of the species, but attention to the notes in E. p. 38 should, in most cases, enable it to be diagnosed. The less biserrate forms are near *R. insignis* Déségl., the glabrous-styled ones approach *R. leiostyla* Rip., and those with more globose fruit are near *R. sphæroidea* Rip. V.-c. 3, 5, 14, 17, 22, 34, 43, 55, 58, 62, 78.

R. RUBELLIFLORA Rip. ex Déségl. Ess. Monogr. p. 109. This runs very near *R. dumalis*, of which it is regarded by some as a variety differing only in its bright rose flowers, but it is also a taller, stronger bush, with much more glaucous and more strongly biserrate leaflets. As it grows on White Down in Surrey, it looks a very well-marked species, but specimens so named from other stations present less distinctive features. Dingler refers two of my gatherings to *R. dumalis*, which in the absence of knowledge of the colour of the flowers is quite possibly correct. V.-c. 3, 17, 58.

R. LEIOSTYLA Rip. ex Crép. Bull. Soc. Bot. Belg. p. 238. Glabrous styles, oval leaflets, not much narrowed at either end, nor, on the other hand, broadly oval, and ovoid fruit, often with spreading or ascending sepals, distinguish this species, but it merges insensibly into forms with more subglobose fruit, narrower or broader leaflets, slightly hairy styles, &c. V.-c. 3, 11 ?, 14, 17, 49 (or 52), 58, 62.

[*R. Chaboissæi* Gren. Fl. Jur. p. 241. This name is not used by Sudre or Dingler, and on account of its indefiniteness I propose to exclude it. The examples mentioned in E. p. 44 may be provisionally placed to *R. leiostyla* Rip.]

[*R. cladoleia* Rip. ex Déségl. Cat. Rais. p. 163. A Leicestershire specimen, collected by Mr. C. P. Headly at Great Stretton (see Watson Exch. Club Rept. 1906), was referred here by Sudre, but its styles seem to be too hispid, and it will fall readily under *R. dumalis*.]

[*R. canina* var. *dumalis* f. *Schlimperti* Hofm. in Sitz. Abhandl. Nat. Ges. Isis, p. 13. This is a name given by Dingler to six of my gatherings, which have been referred to as many different species by Sudre. The specimens undoubtedly vary very greatly, and it is not easy to see what they have in common, nor does the description, though a long one, throw much light on the peculiarities of the variety, unless they are its spreading sepals and glabrous styles. It is best excluded until it is better understood.]

R. SPHÆROIDEA Rip. ex Déségl. Cat. Rais. p. 169. This corresponds in this subsection to *R. sphærica* and *R. globularis* in the two last. V.-c. 3, 5, 17, 58.

R. ERIOSTYLA Rip. & Déségl. in Cat. Rais. p. 165. The only example I have seen like this species, besides those referred to in E. p. 42, is one from Hunts (*Ley*). Sudre confirms the name, but Dingler thought it rather *R. canina* var. *gregaria* H. Braun, though it does not agree with other specimens so named. It is best under Sudre's name, which is already in our list, though not very well confirmed. Ley's specimen is very near *R. sphæroidea* Rip., though with more woolly styles. V.-c. 3 ?, 31, 49 or 52.

R. RECOGNITA Rouy in Bull. Soc. Bot. Fr. xxii. p. 296. This species is remarkable for both its leaflets and its fruit being narrow and attenuate at each end. The Brecon plant is a smaller leafleted form, which Dingler thinks to be nearer *R. canina* var. *fraxinoides* H. Braun, but the two might well be combined. V.-c. 17, 42, 58.

R. GLABERRIMA Dum. Monogr. Ros. Fl. Belg. p. 63. The combination of glabrous styles with a subglobose or broadly ovoid fruit distinguishes this from all other large-leafleted forms of the subgroup except the next, which differs as described. I have three specimens so named by Dingler, two of which, from widely different stations in Cheshire, were placed to a new variety, *R. dumalis* var. *cornaviensis* (ined.) by Sudre. V.-c. 17, 58.

[*R. villosiuscula* Rip. ex Déségl. Cat. Rais. p. 166. This is very near the last, with which it might be combined, either as a synonym or a variety. It differs only in its prickly, instead of unarmed, flowering branches, decidedly pubescent petioles, and pale rose instead of white flowers, but these characters are not constant. Sudre has so named one or two Surrey specimens for me, which fit quite as well under *R. glaberrima*.]

[*R. malmundariensis* Lej. Fl. Spa, p. 231. This name has not been used by Dingler or Sudre for any of my specimens, so in view of my remarks in E. p. 41 I propose to exclude it.]

LEAFLETS MEDIUM.

R. VIRIDICATA Pug. ex Gren. Rev. Fl. Jur. p. 67. Although not more than suspected to be British in my "Eu-caninæ," this turns out to be our most abundant form—that is, if I may judge from the number of individuals in my herbarium, of which the majority are from S. Devon and Surrey. There also seems to be more agreement than usual between Dingler and Sudre as to the names of the specimens they have both seen, but I have about half-a-dozen which have been seen only by Sudre, and some seen by neither. It is characterised by its rather small leaflets, never very much biserrate, and often quite as little so as in the *Transitoriæ*. Its fruit is normally subglobose or broadly ovoid, and rather small, but it varies to quite ellipsoid and larger. The styles should be rather long and densely hispid, though shorter, more glabrous-styled forms occur. It is often with difficulty distinguishable from *R. insignis* Déségl. V.-c. 3, 14, 17, 22, 32, 34, 36, 43?, 55, 58.

[*R. analoga* Déségl. in Bull. Soc. Bot. Belg. xix. p. 30 is the name applied by Sudre to one of my Cheshire specimens which I place under *R. viridicata*, but which Dingler thinks near *R. canina* var. *fissidens* Borb. I do not know the latter, but though the specimen is not typical *R. viridicata*, it certainly is no nearer *R. analoga*.]

R. CARIOTI Chab. in Cariot, Étud. Fl. ii. p. 67. A glabrous-styled form with medium sized broadish leaflets, and ovoid or urceolate fruit. It is near *R. stenocarpa*, from which its broader leaflets and fruit should distinguish it; it is also normally more prickly than the former and has white flowers. Dingler places some of my specimens to *R. glaberrima*, from which its smaller leaflets, more numerous prickles, and more glandular and hairy petioles distinguish it. V.-c. 17, 58.

R. STENOCARPA Déségl. in Mém. Soc. Ac. Maine & Loire, xxviii. p. 112. Glabrous-styled like the last, this may be distinguished from it by its narrower leaflets and fruit, which is often quite ellipsoid, and by its rose flowers. It is much commoner than *R. Carioti*. A Surrey form with leaflets narrower than usual was referred by Dingler to *R. canina* var. *fraxinoides* R. Braun. V.-c. 3, 17, 23, 31, 32, 36, 58.

R. BISERRATA Mér. Fl. Par. p. 190. A specimen from Cheshire and one from Salop have been referred to this both by Dingler and Sudre, but the Cheshire specimen departs greatly from the type in its quite ovoid, almost ellipsoid fruit, its long hispid, instead of short villous styles, its much larger leaflets and strongly reflexed sepals, which are, however, much glandular-ciliate. The Salop specimen is much nearer the description in most respects, but is still somewhat doubtful. Specimens from the other vice-counties cited have not been seen by either Dingler or Sudre, but belong here, I think. V.-c. 36, 40, 41, 58?, 69.

[*R. canina* var. *squarrosa* Rau, Enum. Ros. p. 77. Though a common variety on the Continent, I have only had this name given to a single specimen, from Surrey. Sudre so names a plant which certainly has more prickles on the flowering branches than usual, and though a few of these are straight, the straight ones are very small, almost like acicles, while the main ones are quite hooked, whereas var. *squarrosa* should have very numerous, long, straight prickles. My specimen also has subglabrous styles; they should be villous. I think it is best placed under *R. viridicata*.]

LEAFLETS SMALL.

R. ADSCITA Déségl. in Billotia, p. 34. This resembles *R. stenocarpa*, from which its long hairy styles, on a conical disc, form the best distinction. It usually also has many and stout hooked prickles, smaller leaflets, and white flowers. It seems tolerably frequent in Surrey. V.-c. 13, 17, 40 ?, 58, 65.

R. SYLVULARUM Rip. ex Déségl. Cat. Rais. p. 164. I have two Surrey and one Cheshire specimen placed to this species by both Sudre and Dingler, though they have not much in common in appearance. Small, broadly ovoid or subglobose fruit, with thinly hispid styles, and fully glandular-biserrate leaflets seem to be their common characteristics, the shape of the fruit being the best distinction from *R. adscita*. By description the prickles should also be straight or slightly inclined, but they are unusually strongly hooked in the Cheshire specimen (which also has densely hispid styles), and quite decidedly curved on those from Surrey. I do not know the colour of their flowers. V.-c. 17, 58?

[*R. firmula* God. Fl. Jur. Suppl. p. 71. A very ambiguous species, said by Godet to be synonymous with *R. mucronulata* Déségl., though he describes it as biserrate. It should also have straight prickles and roundish ovoid fruit. Both Dingler and Sudre agree to place a Surrey and a Cheshire specimen to this, though Dingler thinks it a doubtful species. Both my specimens have very hispid, almost woolly styles, but, in spite of this, I think they might be included in *R. sylvularum*.]

R. canina var. parisiensis Rouy, Fl. Fr. vi. p. 288. This is also very near *R. sylvularum*, but is described by Rouy as having the habit of *R. senticosa* Ach., with biserrate leaflets. I have a specimen from Cheshire agreed to by Sudre. It has very small, very strongly biserrate leaflets, narrowed at each end, rather short, curved, subconical prickles, ovoid fruit, and glabrous styles. A Herefordshire specimen (*Ley*) matches it very closely, and one from Bucks (*Druce*) probably belongs here. V.-c. 24, 36, 58.

SUBGROUP ANDEGAVENSES.

This is a small subgroup, and though my specimens have been referred to at least fifteen different names, they can probably be reduced to less than ten, none of which are common, and several appear to be quite rare. In the aggregate its members differ from those of the last three subgroups by the presence of stalked glands on the peduncles. They may best be divided into those with simply and those with doubly serrate leaflets, though an intermediate subdivision might be made corresponding to the *Transitoriæ*.

Leaflets Uniserrate or nearly so.

R. andegavensis Bast. Fl. Maine & Loire, p. 180. As a segregate, *i.e.* the form with hispid styles, this appears to be much less frequent than the next; in fact, I only have two specimens of it, named by Sudre. They are from adjacent stations in Surrey, but I have seen it certainly from Northants and Wilts, and though not common, I have little doubt that it is widely distributed. V.-c. Wilts, 13, 17, 32, 40?

R. agraria Rip. ex Déségl. Cat. Rais. p. 181. This may be regarded as a glabrous-styled form of *R. andegavensis*, and as such is only varietally distinct. Its leaflets are said to be broader, but both broad and narrow-leafleted forms occur in both. V.-c. 3, 15, 16, 17, 36?, 57, 58.

[*R. edita* Déségl. Cat. Rais. p. 178. I have a specimen from Cheshire for which this name is suggested by Dingler, and to which it is referred by Rouy's key, but it does not in the least resemble *R. surculosa*, as a form of which the species was founded. It has medium-sized suborbicular leaflets, very pubescent petioles, an occasional glandular seta on one or two of the peduncles, subglobose fruit, and thinly hispid styles, colour of flowers unknown. Sudre refers it to *R. pubens* Déségl. & Ozan., of which I know nothing but the description, with which my specimen does not agree. Though differing in several respects, it is sufficiently near *R. Rousselii* Rip. to be included in that species.]

R. Rousselii Rip. ex Déségl. Cat. Rais. p. 184. This has suborbicular, very broad-based leaflets of medium size, glabrous or subglabrous styles, and broadly ovoid fruit. My Cheshire specimen is confirmed by both Sudre and Dingler. A Surrey specimen with almost unarmed stem, white flowers, ochreous green, broadly ovate, slightly irregularly serrate leaflets, reddish glandular sepals, bracts and hispid peduncles, and ovoid hispid fruit, was placed by Sudre to *R. fragrans* Gren., a name of doubtful group and still more doubtful application, hence best omitted. Though differing considerably, it seems to me to come nearest to *R. Rousselii* Rip. V.-c. 17?, 55, 58.

R. litigiosa Crép. in Bull. Soc. Bot. Belg. viii. p. 267. A Surrey specimen, from Telegraph Hill, is referred to this species by both Crépin's and Rouy's keys. Sudre also confirms the name, which was the one first applied by Dingler to the Ham Common *R. stylosa* var. *evanida*, and to which variety the Telegraph Hill specimen bears a close resemblance. It differs from var. *evanida* chiefly in its more slender prickles, and its more hemispherical head of stigmas, both of which characters take it further from the *Stylosa* group than var. *evanida*, which itself is at most an outlier of that group. The two might almost be combined under the present group. V.-c. 17.

R. surculosa Woods in Trans. Linn. Soc. xii. p. 228. I can say nothing further about this species than my remarks in E. pp. 50–51. A Hereford specimen (*Ley*) seems best placed here, but it is not very satisfactory. V.-c. 13, 21, 36 ?

Leaflets Biserrate.

[*R. verticillacantha* Mér. Fl. Par. p. 190. This name is not used by Dingler or Sudre, and in view of Déséglise's opinion (E. p. 52) it is perhaps best excluded. If, however, *R. inconspicua* turns out to be synonymous, that name must be dropped in favour of *R. verticillacantha*.]

R. inconspicua Déségl. Cat. Rais. p. 188. This may be regarded as just biserrate *R. andegavensis*. The calyx-tube in either appears to be sometimes smooth, sometimes glandular-hispid. V.-c. 3, Wilts, 17, 23 ?, 32, 34 ?, 36, 38, 40, 58, 70, 99, Co. Down ?

[*R. Suberti* Rip. ex Déségl. Cat. Rais. p. 183. This is too near *R. inconspicua* to be kept up. It is said to differ by its somewhat larger and more biserrate leaflets, more weakly setose peduncles, more elongate fruit, and less hairy styles; but these differences do not appear in conjunction. The name is applied by both Dingler and Sudre to specimens from Cheshire and Surrey, though Sudre thought one of the Surrey examples was nearer *R. recognita* Rouy, from the very few setæ on the peduncles. This specimen certainly has much the look of *R. recognita*, but if hispid peduncles have any value, it cannot be that.]

R. Lemaitrei Rip. ex Déségl. Cat. Rais. p. 182. This is a step further from *R. inconspicua* in its quite glabrous styles. I have seen no other examples than those mentioned in E. p. 48, which agree better with Ripart's description than his own specimens do. V.-c. 2.

R. aspernata Déségl. in Journ. Bot. 1874, p. 170. The only good examples I have seen of this come from S. Devon, though one from Hereford (*Ley*) differs but little in its decidedly small leaflets. Sudre places another S. Devon specimen of mine here, with very weakly though not very thinly hispid peduncles and fruit, which latter is globose, and I have seen very similar plants from Hereford (*Ley*) and W. Gloster (*Roper*, Wats. Exch. Club, 1910). They seem to agree with the description of *R. firma* Pug., but that name has not been confirmed, and they are best placed under an aggregate *R. inconspicua*, not to the present species. V.-c. 3, 36.

R. latebrosa Déségl. in Journ. Bot. 1874, p. 171. A well-marked species by the acicles on its flowering-branches. Besides those mentioned in E. p. 54, an Oxfordshire specimen (*Druce*) must be placed here. V.-c. Cornwall, Devon, 23.

R. canina var. Schottiana Ser. ex DC. Prodr. ii. p. 613. This name has been given by Sudre to a Cheshire specimen. The variety seems to be distinguished from *R. inconspicua* chiefly by the absence of prickles, but the continental interpretation of it gives it strongly biserrate leaflets, ovoid fruit, and villous styles. The specimen seen by Sudre agrees very well with these characteristics, but two other Cheshire specimens, which differ only in having a very few prickles and in rather less biserrate leaflets, and are therefore nearer to the description, have been referred to *R. inconspicua* by both Sudre and Dingler. V.-c. 58.

[*R. disparilis* Luc. & Ozan. in Bull. Soc. Dauph. p. 328. An ambiguous species described as having either simply or doubly serrate leaflets, almost straight prickles in a whorl, few and deciduous glandular setæ on the peduncles, and short hispid styles. I have three specimens named by Sudre, *viz.* two from Cheshire and one from S. Devon. Dingler has only seen one of those from Cheshire, which he says definitely "cannot be *R. disparilis*, but between *R. agraria* and *R. verticillacantha*," an opinion which I think might apply to all three.]

SUBGROUP SCABRATÆ.

This is a small subgroup, though the attempts to name its British representatives have not met with much success. Its members may be regarded either as forms of the subgroup *Dumales*, in which the primary * leaf-nerves have subfoliar glands, or as glabrous forms of the *Borreri* group. The former classification is, I think, the best. Our species are probably reducible to about three.

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* In my former papers I have designated these the "secondary" nerves, following the continental practice. I mean the main nerves springing from the midribs.

[*R. scabrata* Crép. This species, never having been described, is best excluded. Crépin seems to have used it as a group-name only, so far as British specimens are concerned.]

R. Blondæana Rip. ex Déségl. Ess. Monogr. p. 133. Usually distinguishable in the British forms of the subgroup by its medium, or rather large, oval leaflets, smooth or very thinly glandular peduncles, subglobose fruit, and hispid styles, but as in most other species, a good deal of latitude seems permissible, or varietal names will have to be used. It is, I think, our most frequent form, and covers most of what was formerly labelled *R. marginata* Wallr., as well as the more glabrous forms of *R. arvatica* Baker. One of my Cheshire specimens has been referred to *R. præterita* Rip. by both Sudre and Dingler, but the latter remarks that that species is inseparable from *R. Blondæana*. It is chiefly a northern and western form. V.-c. 34, 36, 38, 43, 57, 58, N. Yorks.

R. vinacea Baker, Rev. p. 32. Normally this has large elliptical leaflets narrowed at each end, smooth peduncles, ellipsoid or ovoid fruit, and hispid styles, but it is not always easily separable from smooth-peduncled forms of *R. Blondæana*, which sometimes have both leaflets and fruit very like those of *R. vinacea*. Typical examples appear to be much less frequent than those of *R. Blondæana*, like which it attains its greatest frequency in the north and west of England. I think it is best to exclude the specimens without subfoliar glands mentioned in E. p. 59. V.-c. 58, 62.

[*R. trachyphylla* Gren. Fl. Jur. p. 243. I doubt the policy of introducing this name or var. *nuda* into our list. At best its description was a misrepresentation of Rau's species, which belongs to quite a different group. The Glen Shee specimen (E. p. 60) may perhaps belong here, but that from Kilvington is best under *R. Blondæana*.]

[*R. marginata* Wallr. I have nothing to add to my remarks in E. p. 60, and this name had better be excluded. Specimens so named are probably all referable to *R. Blondæana*.]

R. Beatricis Burn. & Gremli, Ros. Alp. Mar. Suppl. p. 14. Although I have referred to *R. vinacea*, which it closely resembles, the only specimen to which Sudre has given this name, it may perhaps be retained for certain forms of this subgroup with small leaflets, small peduncles, subglobose fruit, and glabrous or thinly hispid styles. Two or three gatherings from Malden, Surrey (*Britton*), I think belong here, the only ones of the subgroup which I have seen from the south-east of England. One of them is remarkable for having fine glandular acicles on its flowering shoots, like those in the *Rubiginosæ*, but I do not think it belongs to that subsection. V.-c. 17, 36, 40, 58.

GROUP DUMETORUM.

This is a large and troublesome group. The presence of the smallest quantity of hair on the midribs suffices to mark the distinction between its members and those of the group *Canina*, and in some bushes it is difficult to find any other characteristic, which gives considerable weight to the idea that many of them may be mere varieties of that group. Many of the species of the present group are mainly distinguished from one another by increasing development of hair on the leaflets; other written characters exist, but they are so variable that they are difficult of application.

SUBGROUP EU-DUMETORUM.

Simply or irregularly serrate leaflets and smooth peduncles are the distinguishing features of this subgroup. If attention be paid to the presence of hairs on the under surface or midribs of the leaflets, not on the petioles only, such as are frequently seen in the *Canina* group, there should be no difficulty in recognizing its members as a whole, but their separation into species or varieties is difficult.

R. DUMETORUM Thuill. Fl. Par. p. 250. This species should have its leaflets hairy on both sides, even when old, and subglobose fruit. It is very difficult to separate from *R. urbica*, and often, at least in the herbarium, from *R. obtusifolia*. Most continental authors distinguish it from the former by little else than its more hairy leaflets, with unarmed petioles and less hairy styles, while it is marked off from *R. obtusifolia*, when the group characters of the latter are not well-marked, chiefly by its rose-coloured flowers. Yet Thuillier's description credits it with "petioles minutely prickly all round," and "flowers rose or white." Keller treats it as a group name only, a treatment which Crépin had already suggested. The vice-county distribution here given is chiefly that of forms which cannot be definitely referred to any other segregate. V.-c. 2 ?, 3, 32, 36, 58, 88.

R. SUBMITIS Gren. in Schultz Arch. p. 332. This is the common form of *R. dumetorum* (agg.), of which it may be regarded as an ovoid-fruited variety, but although Thuillier described the fruit of his species as spherical, the only example I have seen of his gathering has it ovoid or ellipsoid. Long peduncles and very spreading or even decidedly rising sepals, often rather long persistent, are frequent in specimens referred to *R. submitis*, and some of them have slightly biserrate leaflets. The rising sepals cause these to be sometimes mistaken for members of the *Coriifolia* group, but their thinly hispid styles and long peduncles should indicate the group. Two specimens of this form, from Radnor, with decidedly erectish sepals, have been seen by Crépin, who considers them to belong to the present, and not to the *Coriifolia* group. On the other hand, both Sudre and Dingler consider a Cheshire form, which is practically identical with that from Radnor in peduncles, fruit, sepals, and styles to belong to the *Coriifolia* group. I prefer Crépin's opinion. V.-c. 2, 17, 36, 43, 58, 62.

R. GABRIELIS F. Gér. ex Magn. Scrin. Fl. iv. p. 84. I have not been able to gain access to Magnier's work cited, nor have I seen any continental examples, so can only form an idea of it from several specimens named for me by Sudre and Dingler, and by the short note in Asch. & Graebn. Fl. Mitteleur. (vi. p. 177). It is distinguished from the foregoing by its smaller, less hairy leaflets, often, but not always, narrowed at each end. Its fruit may be subglobose or ovoid, but Sudre refers two of my S. Devon examples with globose fruit to var. *calophylla* Rouy. V.-c. 3, 14, 17, 32, 34, 36 ?, 58.

R. URBICA Lém. in Bull. Soc. Phil. Par. p. 95. This species labours under the same disadvantages as *R. dumetorum*, viz. an inadequate author's description, and a diversity of modern opinion as to its interpretation. Generally speaking, it has less hairy leaflets than *R. dumetorum*, but they should still be hairy above, at least when young. Its petioles should be prickly, fruit ovoid, and styles decidedly hispid. I have only two specimens, both from Surrey, named by Sudre, none by Dingler. Unfortunately one is a mixture, and although I suggested the name for the other myself, I cannot now see how it differs from *R. submitis*. I have therefore nothing definite to refer to any vice-county, except those mentioned in E. p. 72, and one or two I have named myself. V.-c. 3, 17, 39, 62.

R. SEMIGLABRA Rip. ex Déségl. Cat. Rais. p. 204. Distinguishable as a rule from *R. urbica* by its leaflets having only the midribs hairy and its styles villous. A Northants specimen (*Ley*) with very globose fruit may be *R. globata* Déségl., which Keller regards as a large-fruited form of *R. semiglabra*. The Leicester specimen (*Horwood*) was referred to *R. jactata* by Sudre on account of its irregular serration, but I agree with Dingler, who places it under *R. semiglabra*, though towards *R. hemitricha*. The species is fairly frequent, though perhaps less so than might be inferred from the number of vice-counties for which it is recorded. It might be considered as a mere variety of *R. urbica*. V.-c. 3, 14, 17, 22 ?, 31, 32, 40, 50, 55, 62, 65, 70.

R. TRICHONEURA Rip. ex Déségl. Cat. Rais. p. 204. This comes very near *R. subglabra*, but the hairs beneath the leaflets are not confined to the midribs, and the styles are only thinly hispid, not villous. The leaflets in most of my specimens are rather small; large leafleted forms run near *R. sphærocarpa*, but their fruit is smaller and seldom so globose. Several of my Surrey specimens were labelled *R. submitis* by Sudre, but they are too glabrous for that, and Dingler thinks they are either *R. trichoneura* or very near it. It is, perhaps, no more than a variety of *R. urbica*. V.-c. 13, 14, 17, 22, 32, 36, 58, 78.

R. PLATYPHYLLA Rau, Enum. Ros. p. 82. Large, broadly oval, rarely elliptical leaflets, hairy only on primary nerves beneath, with large ovoid fruit and villous styles, are the chief characteristics of this species. I do not think it is at all common, and have never gathered it myself. V.-c. 3, 13, 17, 79.

R. SPHÆROCARPA Pug. ex Déségl. Cat. Rais. p. 208. Differs from the last in its less hairy rather smaller leaflets, unarmed petioles, white flowers, globose fruit, and thinly hispid styles. V.-c. 3, 58, 62.

[*R. canina* var. *calophylla* Rouy, Fl. Fr. vi. p. 296. I have four specimens thus named by Sudre. Two of them, from S. Devon, are very near *R. Gabrielis*, but with more globose fruit. A third, from Cheshire, I also refer to that species. Dingler labelled it "approaching *R. Vaulxiana* Mout.," one of the *Deseglisei* subgroup, probably on the strength of a single glandular seta on one of the peduncles, but remarks that it is very near another Cheshire specimen, also labelled var. *calophylla* by Sudre, but which Dingler thinks very near *R. obtusifolia*, as a large stout form. I do not know enough of Rouy's variety to include it, in the face of these contradictory opinions.]

R. RAMEALIS Pug. ex Déségl. Cat. Rais. p. 203. Chiefly recognized from *R. urbica* by its elongate ovoid fruit; it also has its leaflets glabrous above and unarmed petioles, and is near *R. semiglabra* except in fruit. My only gathering is confirmed by both Sudre and Dingler. V.-c. 58.

[*R. corymbifera* Borkh. in Vers. Forstbot. Beschreib. p. 319. This must certainly disappear from our list. The S. Wilts specimen mentioned in E. p. 79, is *R. stylosa* Desv., and that from Plymouth is *R. leucochroa* Desv.]

R. JACTATA Déségl. in Journ. Bot. 1874, p. 169. This and the two next species are distinguished from the foregoing ones by their leaflets being irregularly serrate. It is usually a large coarse plant, with rather thinly hairy leaflets, thinly hispid styles, and largish ovoid fruit. The more decidedly biserrate forms are not easily distinguished from *R. hemitricha*, and the subsimply serrate ones are near *R. trichoneura*. V.-c. 17, 31, 32, 58.

R. SPINETORUM Déségl. & Ozan. in Bull. Soc. Dauph. p. 331. A specimen from Minehead, S. Somerset, with unarmed flowering-branches, very large almost biserrate leaflets, very thinly hairy on midribs only beneath, globose fruit and very hispid styles, agrees with Rouy's key, and the name has been confirmed by Sudre. It seems distinct, but I know nothing more of the species. V.-c. 5.

[*R. canina* var. *squarrosoides* Rouy, Fl. Fr. vi. p. 295. Two Surrey specimens are referred here by Sudre. I cannot see how they differ from *R. jactata*. The leaflets should be a little more hairy beneath than in that species, but my specimens are not so.]

[*R. hispidula* Rip. ex Déségl. Cat. Rais. p. 217. This name has been given by Dingler to a specimen from Hunts (*Ley*). It has some of its leaflets with a slightly hairy midrib, some glabrous, and longish ellipsoid fruit. Sudre could not see the hairs on the midribs, so named it *R. separabilis*. *R. hispidula* seems far too unsatisfactory a name to retain, see E. p. 76. The specimen fits fairly well under *R. semiglabra*.]

SUBGROUP CANESCENTES.

These have biserrate leaflets, hairy at least on midribs beneath, and smooth peduncles.

R. CANESCENS Baker, Rev. p. 28. I have seen no further specimens of this, and cannot therefore add to my remarks in E. pp. 84, 85. It is quite possible that Déséglise is right in considering it to be synonymous with *R. hemitricha* Rip. V.-c. 62.

R. HEMITRICHA Rip. ex Déségl. Cat. Rais. p. 204. Though described as a biserrate *R. urbica*, with villous glandular petioles, most of my specimens are hardly more than irregularly serrate, and some scarcely that, so that they differ little from *R. urbica* or *R. submitis*. My Cheshire specimens, where it seems frequent, have villous styles, as in *R. urbica*, but they have smaller much less hairy leaflets. An example with still smaller nearly simply serrate leaflets, from Hunts (*Ley*), is named *R. canina* var. *oxyphylloides* Rouy, and a very similar one from Surrey, *R. jactata*, both by Sudre, but Dingler calls them both *R. hemitricha*, which is nearer the mark. An aberrant form from near Shepperton, Middlesex, with many of its sepals suberect, glabrescent styles, and almost uniserrate leaflets, which was distributed by Messrs. Groves as *R. implexa* Gren., is placed here by Sudre, where it is much more at home than under *R. implexa*. Two Surrey plants, almost identical with the Shepperton one, were labelled *R. submitis* by Sudre; they also are best placed here, but all three may quite likely belong to some undescribed species near *R. submitis*. V.-c. 3, 17, 21?, 31?, 32, 34, 36, 40, 58, 77?, 79.

SUBGROUP DESEGLISEI.

The members of this subgroup are distinguished from those of *Eu-dumetorum* by their peduncles being glandular-hispid. There is danger of confusing them with the *Stylosæ*, but less stout prickles, broader bracts and upper stipules, shorter peduncles, and stigmas not in an elongate conical head should distinguish them.

R. DESEGLISEI Bor. Fl. Centr. Fr. p. 224. This appears to be a rare segregate in Britain. Besides the one mentioned in E. p. 79, I have only two Cheshire gatherings, confirmed by both Sudre and Dingler, and I have seen specimens from Hereford, Hunts, and Northants (all *Ley*). The leaflets in my specimens are of medium size, oval or broadly so, very thinly hairy above, more densely so beneath, and the peduncles are thinly glandular-hispid, not hairy. V.-c. 3?, 31, 32, 36, 58, 65.

R. INCERTA Déségl. Cat. Rais. p. 215. Chiefly distinguished from *R. Deseglisei* by its leaflets being glabrous above, and hairy on primary nerves or midribs only beneath; they are also slightly biserrate. I have only one specimen so named by Dingler, which is equally near *R. Burnati*, to which Sudre placed it. It has the prickles of *R. Burnati*, but differs from both that and *R. incerta* in its uniformly serrate leaflets and thinly hispid styles. I place here all my specimens named *R. Burnati* by Sudre, as well as others I had so named, though some of the Hereford examples approach those referred to under *R. imitata*, but with ovoid rather than ellipsoid fruit. V.-c. 10, 32, 36, 40, 57?, 58, 62.

[*R. Burnati* Chr. ex Burn. & Grem. Ros. Alp. p. 92. I have not seen any of Christ's specimens, but by description the only tangible differences from *R. incerta* are the long arcuate, not stout hooked prickles, and the more villous styles. I have eight or nine examples, all from Cheshire, referred to this species by Sudre. Dingler has only seen one of these, which he says "cannot be *Burnati*," but does not say why. Almost all have glabrous or subglabrous styles, and many have quite short but arcuate prickles; the sepals are usually spreading or even somewhat ascending, and the fruit subglobose. One or two have the arcuate prickles of *R. Burnati*, but not the villous styles. Many of my specimens agree very well with *R. Deseglisei* in their prickles, subglobose fruit, very spreading sepals, and thinly hispid styles, but their leaflets are much more glabrous. For the present I exclude this species in favour of the older *R. incerta*, though my specimens agree well with neither.]

[*R. imitata* Déségl. in Mém. Soc. Maine & Loire, xxviii. p. 120. This species differs from *R. incerta*, of which it has the thinly hairy leaflets and stout hooked prickles, mainly in its pyriform fruit, narrowed into the peduncle; its leaflets also are uniformly simply serrate, and its flowers white. I have nothing with such fruit, but two specimens from Hereford (*Ley*) are thought by Dingler to be a new variety near it. They differ chiefly in their elongate ellipsoid fruit, narrowed at the apex rather than at the base, and in their subglabrous, not hispid styles. Sudre thought them near *R. Burnati*, and they are much like a French example he has sent me so named, but this has quite an obovoid-ellipsoid calyx-tube, as well as the prickles and uniform serration of *R. imitata*.]

[*R. trichoidea* Rip. ex Déségl. Cat. Rais. p. 217. The Stoughton, Leicester, plant (*Horwood*) sent to the Watson Exchange Club as *R. tomentosa* var. *scabriuscula* (see Rept. 1906–7, p. 89), belongs here, I think, but its fruit, besides being hardly elongate enough, is glandular-hispid, so I hardly like to add the name to our list without confirmation. The specimen must at least fall under an aggregate *R. Deseglisei*, but besides the hispid fruit, it has unusually hispid peduncles for the segregate. It is, however, possible that it is a *Tomentosa* form, as at first supposed, but nearer *R. dumosa* Pug. than *R. scabriuscula* Sm.]

R. COLLINA Jacq. Fl. Austr. ii. p. 58. I have seen no specimens referred to this species beyond those mentioned in E. pp. 81, 82. I leave it in this subgroup for the present, but it is doubtful whether it is its proper place. V.-c. 2.

[*R. Kosinciana* auct. angl. (Baker, Monogr. p. 232). The only specimen I possess of this, from the Isle of Wight (*E. F. Linton*), looks very different from anything in this group in its finely, quite simply serrate, lanceolate-elliptical leaflets, very broadly rounded at base, and only very thinly hairy on the midribs, and in its perfectly globose fruit. It will not do for *R. collina* Jacq., though at present I cannot find a name for it.]

SUBGROUP ACICULATÆ.

This subgroup contains species with biserrate leaflets and glandular peduncles, that is, it bears the same relation to the subgroup *Deseglisei* as the *Canescentes* do to that of *Eu-dumetorum*. It contains only one or two obscure forms.

R. CANINA var. ACICULATA Rouy, Fl. Fr. vi. p. 295. I use this name to cover a very peculiar form collected in Surrey. It has rather small, rather narrowly elliptical, fully biserrate leaflets, thinly hairy beneath, long, hispid, solitary peduncles, ovoid fruit, very strongly gland-fringed sepals, and thinly hispid or subglabrous styles. Its peculiarity lies in its fine glandular and eglandular acicles on the flowering branches. Its main prickles are few, small, and hooked. Sudre thinks it near var. *aciculata* Rouy, but different. I do not know the variety except from Rouy's key, which does not mention the aciculate branches. The name is provisional only. V.-c. 17.

A South Devon plant (*Savery*), quite distinct from the last, comes into this subgroup, but I am totally at a loss for a name. It has suborbicular, cuspidate, biserrate leaflets, slightly hairy on midribs only beneath, glandular peduncles in clusters of three, somewhat gland-ciliate sepals, and glabrous styles. The fruit is not formed; the prickles are few, rather slender and arcuate, and flowers white.

GROUP GLAUCA.

In most cases the members of this group are well marked off from those of other groups by their glabrous leaflets, dilated stipules, especially the upper ones and bracts, short peduncles, erect long-persistent sepals, and especially by their broad woolly head of styles, but a considerable number of individuals may lack one or more of these characteristics, notably those of the subgroup *Subcaninæ*, in which the sepals are reflexed or not more than spreading, instead of rising or suberect. Since individuals of the *Canina* group may often have spreading or sometimes more or less rising sepals, as well as one or more of the other features of this group, it is often extremely difficult to draw the line between them. The style characters are the most reliable. It is rare in the South of England, becoming more frequent in the North, and common in Scotland, where a large number of forms occur which have not been satisfactorily identified. I have treated the group at somewhat greater length than the foregoing ones, but fear it is not at all well elucidated. It will be seen that it is in as much need of revision as the subsection *Villosæ*.

SUBGROUP REUTERI.

This contains those species and varieties of the group which have their sepals suberect or at least rising above the disc. They may be subdivided either into those with smooth or hispid peduncles, or those with uniserrate or biserrate leaflets. I have followed the former method, but if the subgroup prove a large one, as I expect will be the case when the Scottish forms have been worked up, four subdivisions might be made from a combination of each of the two indicated. As they stand at present, each of the following names includes examples differing widely from one another in size and shape of leaflets and fruit.

Leaflets Uniserrate.

R. Reuteri God. ex Reut. Cat. Genèv. ed. 2, p. 68. Uniserrate leaflets and smooth peduncles suffice to distinguish this from its British allies. I have very little material of it. A form with white flowers occurs near Killin (*Barclay*), which has also very spreading sepals, so that it is quite as near the *Subcaninæ* subgroup. V.-c. 16, 34, 43, 58, 59, 62, 65, 67, 88.

[*R. Crepiniana* Déségl. ex Baker, Rev. p. 28. I feel sure that this is only a synonym of *R. Reuteri.* Déséglise himself made but slight differences (see E. p. 91). Crépin mentions them separately, but without any definition, in his Prim. Monogr., but only gives *R. Crepiniana* in his later Tabl. Analyt., meaning presumably to include *R. Reuteri*, in spite of the latter being the older name. If there is any difference, it lies in the more ovoid fruit of *R. Crepiniana.* I have no specimen except from the original bush at Chelsfield, W. Kent.]

R. intricata Gren. Rev. Fl. Jur. p. 64. Glandular peduncles form the distinguishing feature of this from *R. Reuteri.* I confine the name to examples with quite or very nearly simple serration, referring the irregularly serrate ones to *R. fugax* Gren. This reduces my specimens to three. Sudre has only seen one, from Cheshire, which he labels *R. glauca* var. *subcuneata* Rouy. Dingler also thinks it agrees with that variety in Rouy's key, but does not know it. For the present I prefer to keep it as *R. intricata.* V.-c. 40, 58, 98.

[*R. glauca* var. *subcuneata* Rouy. Fl. Fr. vi. p. 321. This name is applied by Sudre to three of my specimens, *viz.*, the original Chelsfield *R. Crepiniana*, the Cheshire *R. intricata* mentioned above, and a somewhat biserrate form of the latter from Hereford (*Ley*), which I refer to *R. fugax.* The three can hardly go together, and as I know nothing else of the variety I exclude it.]

Leaflets Biserrate.

R. subcristata Baker, Rev. p. 29. I take this name as an older one than *R. complicata* Gren., and think that the two should be regarded as synonymous, as most authors do. Specimens I have referred here vary greatly. One from Buckie Braes, Perth (*Barclay*), has globose fruit, while another from the same station and collector has it remarkably elongate-obovoid. A Radnor specimen has all the appearance of typical *R. andegavensis* but the group characters of *R. glauca.* My Hereford and Cheshire specimens differ considerably from these and from each other. The former Dingler thinks near *R. inclinata* Kern., but says it may be new. The Cheshire specimen, passed by Sudre, is referred to var. *subcanina* by Dingler, though its sepals rise considerably. All five of these (the only ones in my herbarium) might well be placed to as many different species. V.-c. 36 ?, 43 ?, 58?, 65, 69, Northumberland, 78 ?, 79 ? 88 ?, Co. Down ?

[*R. complicata* Gren. Rev. Fl. Jur. p. 64. As already stated, it is best to regard this as a synonym of *R. subcristata.* Even Rouy does not distinguish the two.]

[*R. Reuteri* var. *myriodonta* Christ, Ros. Schw. p. 167. This name has been applied by Dingler, though with some expression of doubt, to two of my Cheshire forms of *R. subcristata*, from which the difference lies chiefly in the more fully glandular-biserrate leaflets. Under a similar classification two other Cheshire gatherings and one from Co. Down (*Waddell*, Wats. Exch. Club, 1909) might be referred here, but the difference from *R. subcristata* is not greater than among the specimens of the latter itself, so I hesitate to retain the name at present.]

R. VENOSA Swartz ex Spreng. Syst. ii. p. 554. Sudre places an E. Ross rose (*Marshall*) to this species, citing it as " *R. glauca* Vill. var. *venosa* (Déségl.) " ; and two Perth specimens (*Barclay*) agree closely. They both have large, broadly oval, subobtuse leaflets, giving them a very different appearance to other forms of the subgroup. The fruit is not formed in the E. Ross specimen, but its calyx-tube is subglobose, and in this stage the sepals spread considerably, but will probably rise later. One of the Perth specimens (*Barclay* No. 15, sent to Wats. Exch. Club in 1908 as *R. Bakeri*) has ovoid fruit, with suberect sepals, the other is not fully formed, but looks similar. The species looks quite distinct. V.-c. 88, 106.

R. STEPHANOCARPA Déségl. & Rip. in Mém. Soc. Ac. Maine & Loire, xxviii. p. 115. Distinguished in the subgroup by the primary veins of the leaflets bearing subfoliar glands. None of the four specimens in my herbarium has been seen by Sudre, and only one by Dingler, *viz.*, one from Co. Down (*Waddell*, Wats. Exch. Club, 1906). Dingler says of this, " *R. glauca* Vill. var. nov., *not* var. *complicata* Gren. [which I had named it]. The leaflets are copiously compound, their shape is lanceolate, the lowest with several subfoliar glands." Perth specimens (*Barclay*) are even more decidedly glandular beneath, and if not actually referable to *R. stephanocarpa* as a segregate, they at least fall into a subdivision of the subgroup of which that species is made the type by Keller, so I adopt the name provisionally. V.-c. 57 ?, 88, Co. Down.

R. FUGAX Gren. Rev. Fl. Jur. p. 64. I have several specimens referable to this as an aggregate, but like most other species in the group it may be subdivided. Only three have been seen by Sudre and Dingler. A Cheshire plant, confirmed by Sudre, is thought by Dingler to be near *R. haberiana* Pug., but he does not dissent from the name of *R. fugax.* One from Hereford (*Ley*) was placed by Sudre to *R. glauca* var. *subcuneata* Rouy, while Dingler thinks its spreading sepals refer it to var. *subcanina*, but they seem to me to rise too much. A Co. Down example

(*Waddell*, Wats. Exch. Club, 1905) is named var. *mutata* Burn. & Grem. by Sudre, while Dingler thinks it near var. *œnensis* Kell., though it has no subfoliar glands. I can find no satisfactory name for a form with very small leaflets from Killin (*Barclay*). V.-c. 36 ?, 58, 65, 81, 88 ?, 98, Co. Down ?.

R. GLAUCA var. ŒNENSIS Kell. in Asch. & Graebn. Fl. Mitteleur. vi. p. 194, non Kern. I introduce this name tentatively, as the representative of a subdivision of this subgroup made by Keller to contain species with hispid peduncles and biserrate leaflets with subfoliar glands on the primary nerves, homologous with *R. stephanocarpa* in those with smooth peduncles. A specimen from Salop (*Ley*) belongs here, but the Co. Down form mentioned under *R. fugax*, having no subfoliar glands, can hardly belong to it. V.-c. 40.

R. HAILSTONI Baker, in Rept. Bot. Exch. Club, 1867, p. 7. I can add nothing to my remarks in E. p. 96, and though I strongly suspect it to be merely an abnormal form, I retain the name until further light can be thrown on it. V.-c. 62.

SUBGROUP SUBCANINÆ.

This subgroup, according to Keller's arrangement, contains just one-third of the names in the whole group, and covers quite a large range of varieties, which he classifies primarily, as he does the first subgroup, into those with simple, slightly double, and fully biserrate leaflets, with their subdivisions of those with smooth and those with hispid peduncles. I think we have representatives of all three primary subdivisions, though I propose, for the present, to disregard that with slightly biserrate leaflets. I have not seen British forms with hispid peduncles. Beyond a suggestion by Dingler that one or two of our British roses belong to the subgroup, I have no names of any of its members from Sudre or Dingler. As already stated, I confine the subgroup to forms in which the sepals do not rise above the disc, but Keller and Dingler admit those in which those parts are almost suberect, thus completely destroying any slight dividing line which might be drawn between the two subgroups; indeed Keller's definition would admit all *Canina* forms with glabrous leaflets and somewhat spreading sepals. Mr. Barclay informs me that a considerable number of Perthshire forms are probably referable to this subgroup, but I have only seen about a dozen from Britain.

LEAFLETS UNISERRATE.

R. REUTERI var. SUBCANINA Christ, Ros. Schw. p. 169. Christ's definition confines his variety to plants like typical *R. Reuteri* but with reflexed sepals, but for the present I include also those which have them spreading. My specimens vary in the shape of their fruit from globose to obovoid. The Co. Antrim specimen (*Waddell*) belongs doubtfully to the group, its only distinguishing feature being its woolly styles, which may occur in the *Canina* group; its long peduncles, reflexed sepals, and narrow stipules and bracts are all features of the *Canina* group. Ley's Hereford specimen has the general characters of the group better marked, but has quite deciduous sepals; it may belong to *R. montivaga* Déségl., a *Canina* form closely connected with the present group. The Graffham, W. Sussex, specimen (*Marshall*), referred here by Rogers, seems to me out of place, though I feel no certainty, and do not know how to name it, unless it be a short-peduncled form of *R. canina* var. *glaucescens* Desv. with sepals less reflexed than usual. If it belongs to this subgroup at all, it may be *R. glauca* var. *salicifolia* Vukot., a name given by Dingler to a Cheshire specimen, which I have placed to *R. insignis* Déségl., following Sudre, but which has really more right in the *Subcanina* subgroup than the Graffham plant. V.-c. 13?, 23, 36?, 40, 78, 79, 88, Co. Antrim?.

Leaflets Biserrate.

R. GLAUCA var. DENTICULATA Kell. in Asch. & Graebn. Fl. Mitteleur. vi. p. 197. A specimen from Perth (*Barclay*), which certainly belongs to this subgroup, has close-set, broadly oval, strongly biserrate leaflets, and large obovoid fruit, and is probably referable to this variety. Another Perth specimen much resembles it, but is much less biserrate, its sepals also spread considerably, so that it may be a form of *R. subcristata*, as the collector named it, but I think it is best in the *Subcanina* subgroup, and by Keller's arrangement it would fall into his subdivision with slightly biserrate leaflets, as a form of his var. *diodus*. Another, though very different looking form, from Cheshire, which from most of its sepals being reflexed belongs to this subgroup, comes near var. *diodus* Kell. in its slightly biserrate leaflets. Unless we recognize a subdivision with such leaflets as distinct from one with them fully biserrate, var. *diodus* should be merged into var. *denticulata*. V.-c. 58?, 88?.

GROUP CORIIFOLIA.

Typical specimens ranged under the *Coriifolia* group should have all the characteristics of that of *Glauca*, but with hairy leaflets, at least on the midribs beneath. As with that group, a subgroup may be made containing plants with reflexed or spreading sepals. Examples may frequently be met with which are intermediate between the *Coriifolia* and *Dumetorum* groups in one or more cardinal features, and sometimes there is difficulty in discriminating certain forms from the *Villosæ*. If any one character be insisted on, I think it should be the woolly and in most cases broad head of styles. A tolerably constant character, at least frequent enough to be useful in case of doubt as to the group, is the slender, often rather small, but much hooked prickles.

SUBGROUP CORIIFOLIÆ.

Leaflets Uniserrate or nearly so.

R. CORIIFOLIA Fries, Nov. Fl. Suec. i. p. 63. As is often the case with the older cardinal species, typical examples seem rare.

I have not a single specimen in my herbarium referable to type *R. coriifolia*, and I think only two of the British specimens in Déséglise's herbarium belong to it. V.-c. 58, 62, 65, 69 ?.

R. FRUTETORUM Bess. Enum. Pl. Volh. Pod. p. 18. Regarded by some authors as synonymous with the type; this I think represents the bulk of our British *R. coriifolia*. Besser's description says its leaflets have the "serratures subgeminate," and continental authors classify them as somewhat biserrate, as well as less hairy than in *R. coriifolia*. I have several specimens named *R. coriifolia* var. *subbiserrata* Borb. by Sudre, which variety is practically synonymous with *R. frutetorum*, the difference, if any, lying in its more globose fruit. Dingler labels all of them that he has seen, except one from Cheshire, "var. *subcollina* Chr. or near it," in spite of their having very rising or suberect sepals. Both Sudre and Dingler include examples with subglabrous or only hispid styles, and long peduncles, which I follow Crépin in placing to the *Dumetorum* group (see under *R. submitis*, p. 22), but I admit that, with the exception of the style clothing, some of these are identical with those referred to *R. frutetorum*, and it is difficult to draw any line. V.-c. 3, 17, 40 ?, 58, 92.

R. IMPLEXA Gren. Rev. Fl. Jur. p. 62. If we confine this, as Grenier defined it, to a form of *R. coriifolia* with glabrous leaflets, or the midribs alone hairy, I do not think it occurs in Britain, but two Cheshire specimens, for which I know no other name, having the lateral nerves hairy, may be admissible, unless they are *R. coriifolia* var. *lucida* Braück. They have somewhat rising sepals. Forms with spreading or reflexed sepals, which have been referred here, are rejected, as they belong to the next subgroup. A specimen from Buckie Braes, Perth (*Barclay*), has only spreading-erect sepals and slightly biserrate leaflets and may belong to the *Subcollinæ*. V.-c 58, Perth ?.

LEAFLETS BISERRATE.

R. BAKERI Déségl. in Journ. Bot. 1864, p. 267. Following the description and type-specimen, typical plants of this species should have their leaflets glabrous above, more or less glandular beneath, and narrowed towards the base, smooth or rarely glandular peduncles, ovoid fruit and spreading-erect sepals. Beyond some of the author's specimens, I have only seen three so labelled, all from Perth (*Barclay*). One of these, No. 15, which I passed in Wats. Exch. Club Rept. 1908, has glabrous leaflets, and therefore is a *Glauca* and not a *Coriifolia* form (see under *R. venosa*, p. 29). One of the other two was labelled var. *Lintoni* by Mr. Barclay, presumably on account of its smooth peduncles, but these and its ovoid fruit are normal for *R. Bakeri*, to which I place it. V.-c. 62, 67, 69 ?, 88.

R. CORIIFOLIA var. LINTONI Scheutz in Journ. Bot. 1888, p. 68. The description and specimens of this variety are not very conclusive. It may perhaps be regarded as intermediate between *R. Bakeri* and *R. celerata*, differing from the former in its subglobose fruit and leaflets always glandular beneath, and from the latter in its more hairy, less broadly oval leaflets. Besides those mentioned in E. pp. 103, 104, I have only seen two specimens, both from Perth (*Barclay*). The sepals are considerably spreading in both, and one has its primordial fruits turbinate, but I think both are correctly referred here. A specimen from N. E. Yorks (*Groves*, Bot. Exch. Club, 1906) was labelled *R. coriifolia* var. *ostensa* Gren. by Sudre. It seems nearest var. *Lintoni*. I have in my herbarium a specimen from Braemar (*E. F. Linton*), in which the hairs on the leaflets are almost confined to the midribs beneath, and its sepals are loosely reflexed on the young fruit. It agrees in other respects with the type, and is probably correctly named, but had I seen it alone I should certainly have referred it to the next subgroup. V.-c. Perth, 92.

R. CELERATA Baker, Rev. p. 31. If we confine this species to examples with leaflets like those of *R. tomentella*, i.e., rather small, broadly oval, or suborbicular, fully biserrate, and glandular on the primary veins beneath, subglobose or broadly ovoid fruit, with suberect sepals and a broad, woolly head of styles, it should be fairly easily recognized, but I have seen no specimens except those mentioned in E. p. 103. V.-c. 39.

R. WATSONI Baker, Rev. p. 29. This is best recognized by its leaflets being rather large, broadly oval, and eglandular beneath, its fruit ovoid or subglobose, and its sepals suberect. It is near *R. celerata*, but besides the difference in leaflets, it has much less glandular petioles. The Perth specimen (*Barclay*) is off type in having somewhat glandular peduncles, and leaflets somewhat narrowed below, which two characters take it towards *R. Bakeri*. V.-c. 65 ?, 69 ?, 70, 88.

SUBGROUP SUBCOLLINÆ.

This subgroup contains species with reflexed or spreading sepals, and like the corresponding subgroup of the group *Glauca*, it is, I think, more extensive than has been supposed. As with all other characteristics, it is difficult to draw the line between reflexed, spreading and suberect sepals, but it is obvious that it cannot be drawn at the same place for each species, as in that case specimens identical in all other respects would be separated.

LEAFLETS UNISERRATE OR NEARLY SO.

R. CÆSIA Smith, E. B. tab. 2367. In my *Eu-caninæ* I followed Déséglise and Keller in placing this species in the *Dumetorum* group, on account of its reflexed sepals and not very woolly styles, but after correspondence with Mr. Barclay, I agree that this is its best place. I have seen no further specimens beyond those mentioned in E. p. 87. Specimens from Dovedale, Derbyshire, have been referred here by various botanists. I have one of these forms, which differs from the type in its much larger leaflets and its decidedly glandular peduncles and even fruit. It is a poor example to found a record upon, and looks very different from the type, though I do not know how to name it, but I do not think any of the Dovedale forms belong to *R. cæsia*. V.-c. Perth, 98.

R. CORIIFOLIA var. SUBCOLLINA Christ, Ros. Schw. p. 191. Dingler refers quite a considerable number of examples to this variety, or to forms of it. It should be characterized by reflexed sepals and uniserrate leaflets, narrowed at base, and hairy only on primary nerves beneath. Most of the specimens named by Dingler have spreading-erect sepals, and fit better under *R. frutetorum*. An Elgin specimen (*Armitage*), referred here by Dingler, has the sepals reflexed, but has its leaflets densely hairly all over beneath, and not narrowed at base; its peduncles also are longish. Specimens from Mid Perth (*Barclay*) may be a little nearer Christ's variety, but are not at all satisfactory. V.-c. 88?, 95?, 98?.

R. TOMENTOSA var. OBOVATA Baker, Monogr. p. 218. This, as stated in B. R. p. 98, must fall into the present group, but the type specimens are in too young a state to determine the direction of the sepals. Ley says they are reflexed and caducous, but has almost certainly been misled by a false specimen. A plant from Garve, E. Ross (*Marshall*), approaches this variety, but has slender arcuate prickles instead of stout uncinate ones; its peduncles also are much longer than they should be for this group. Sudre thought the Garve specimen a very curious form of *R. tomentosa*, to which it perhaps belongs rather than here. V.-c. 66.

Leaflets Biserrate.

R. SUBCORIIFOLIA Barclay, in Ann. Scot. Nat. Hist. July, 1899, pp. 172–179. This is a somewhat aggregate species, as I believe its author intended it to be, but as such it is fairly well defined. Mr. Barclay has very kindly supplied me with a considerable series of it, all from Perthshire. The specimens all agree in their strongly biserrate leaflets and obovoid or elongate-ellipsoid fruit, but the leaflets vary much in hairiness and in subfoliar glands. The glands are mostly few and inconspicuous, and confined to the primary nerves, but they are sometimes as numerous and as scattered and conspicuous as in *R. micrantha*. One of the specimens has quite glandular-hispid peduncles, the setæ extending to the base of some of the fruits. The sepals are, as a rule, long and strongly reflexed, but sometimes spread or even rise above the disc. The latter forms run very near var. *incana*, as indeed many of them do. V.-c. Perth.

R. CÆSIA var. INCANA Borr. in Hook. Brit. Fl. ed. 3, p. 242. Mr. Barclay tells me that all his specimens at S. Kensington, which I mentioned under this variety in E. p. 107, are his *R. subcoriifolia*, so that the only authentic specimen I have seen is the very unsatisfactory cultivated one from N. Mimms. I can only say of the variety that I consider that Borrer's description covers *R. subcoriifolia*, and that I think that many of, if not all, the examples of the latter may be referred to it. It is impossible in the genus to restrict species and varieties to their descriptions verbatim, so that the "spreading widely or even recurved" sepals, and the "bluntly oblong, equally large at each end" fruits of Borrer's description must not be taken too literally. Déséglise considered *R. canescens* Baker to be synonymous. V.-c. Perth?

R. PRUINOSA Baker, Rev. p. 27. Very glaucous leaflets, normally broadly ovate, rounded or subcordate at base, without subfoliar glands, peduncles smooth or very little glandular, and ovoid or subglobose fruit distinguish this species. Except the Tynedale example cited in E. p. 106, I have seen nothing agreeing satisfactorily with it. A very hairy leaved form from E. Inverness comes nearer to it than anything else. V.-c. 67, 96?.

R. LUCANDIANA Déségl. & Gill. in Bull. Soc. Roy. Bot. Belg. xix. p. 36. I think this had better be referred to this subgroup as suggested in E. p. 89, though I have seen no further specimens than those mentioned on p. 88. V.-c. 3, 63.

[*R. glauca* var. *pseudo-cinerea* Rouy, Fl. Fr. vi. p. 325. Sudre thinks an E. Ross specimen (*Marshall*) *near* this. It looks much like Mr. Marshall's E. Inverness *R. pruinosa* in its densely softly pubescent leaflets, but they are decidedly, though finely, glandular beneath. The fruit is very similar. I do not know Rouy's variety, and as Sudre seemed doubtful about the identity it is best excluded.]

GROUP TOMENTELLA.

Some individuals of this group are liable to be mistaken for members of that of *Tomentosa*. Its more glandular members also run near forms of *Micrantha*, while those with eglandular leaflets are often very difficult to distinguish from the group *Dumetorum*. No short definition can be given by which the limits of the group may be preserved, and experts often differ on this point. I think it better to follow the continental practice and call this group *Tomentella*. The naming of a group or subgroup from its oldest member would result in frequent changes with the varying opinions as to its limitations.

Leaflets Biserrate.

R. BORRERI Woods, in Trans. Linn. Soc. xii. p. 210. I now think this must be kept quite distinct from *R. tomentella* and its variety *decipiens*, by the much larger size of all its parts; its habit also is much laxer, giving it a very different appearance. Its peduncles are usually, but not always, glandular-hispid, and many or all of its leaflets are sometimes eglandular. The species is generally easily recognizable, but I have an aberrant form from Hunts (*Ley*), which I had placed to *R. Bakeri*, a species not known by Sudre, who labels it *R. glauca* var. *pseudo-ramealis* Rouy, while Dingler says it is *R. subcoriifolia.* I feel sure it is none of these, but a form of *Borreri*. Most of the specimens labelled *R. inodora* Borr. (non Fr.) belong here. V-c. 16, 17, 18, 21, 31, 32, 36, 57, 58.

R. TOMENTELLA Lém. in Bull. Soc. Phil. Par. p. 95. This is an easily recognized and, I believe, a well-known species. The only difficulty about it is that it passes by imperceptible degrees into forms without subfoliar glands, which appear to be just as frequent as the type, but which are not distinguishable from *R. Carionii*; also its large forms run very near *R. Borreri*. V.-c. 3, 16, 17, 21, 32, 36, 40, 57, 58, 62.

R. TOMENTELLA var. DECIPIENS Dum. in Bull. Soc. Roy. Bot. Belg. xvi. p. 57. This seems to differ from the type, not only in its glandular peduncles, but in its leaflets also being without, or with only very few, subfoliar glands. The Cheshire plant, distributed through the Bot. Exch. Club in 1906 as *R. rubiginosa* × ——, has been referred here by Sudre, and I think perhaps correctly, though I still have a considerable leaning towards my original theory, which is confirmed by Dingler. Two other Cheshire plants, from quite different stations, bear a considerable resemblance to it, even to the mostly abortive fruit. V.-c. 16, 17, 26, 34, 57, 58.

R. CARIONII Déségl. & Gill. in Bull. Soc. Roy. Bot. Belg. xix. p. 34. Though Déséglise places this in his *Pubescentes*, i. e. *Dumetorum* group, it is much nearer to *R. tomentella*, differing in its leaflets being without subfoliar glands, more oval, *i.e.* decidedly less broad, its flowering branches unarmed, its flowers almost white, and its styles subglabrous. Dingler refers both my Cheshire specimens to *R. Borreri*. They are not that, but may very likely be *R. tomentella*. One of them (see Bot. Exch. Club, 1909, p. 373) indeed has a few subfoliar glands, but a different look from *tomentella*. It was passed by Sudre as *R. Carionii*. A specimen from Leicester (*Vice*, Wats. Exch. Club, 1906), passed as *R. amblyphylla* Rip. by Sudre, seems to me to be just the same thing. V.-c. 3, 17, 55, 58.

R. SCLEROPHYLLA Scheutz, in Bot. Not. p. 82. This is distinguished from *R. tomentella* by its much narrower, more glabrous but often more glandular leaflets, which when typical, are lanceolate or even narrowed at each end, as in *R. agrestis*. There is some doubt about some of my specimens. Sudre labelled that from Hereford (*Ley*) *R. hemitricha*, and that from Hunts (*Ley*) *R. canina* var. *pseudo-dumetorum* Rouy, which its author says is *R. tomentella* auct. non Lém., but Dingler considers both to be *R. sclerophylla*. They have subfoliar glands on the lateral nerves (very few in the Hereford example), but do not look at all like *R. tomentella*. I should have certainly classified the Hunts specimen under *R. caryophyllacea* Chr., with which it agrees in the glandular acicles on the flowering branches, and in other details. A W. Kent example was at first thought by Crépin to be *R. Pouzini* Tratt, but he afterwards named it *R. tomentella* var. *decipiens*. It is a very peculiar looking plant, quite different in appearance from *R. tomentella*, and agreeing closely with the description of *R. Pouzini*, but that is a South European species not at all likely to occur in Britain. It is perhaps best under *R. sclerophylla*. V.-c. 16?, 31?, 32?, 36?, 62.

R. TOMENTELLA var. NICHOLSONI Chr. in Bot. Exch. Club Rept. 1880, p. 16. I have seen nothing which can be referred to this beyond the type specimen (E. p. 23), though I had provisionally placed a form from Cheshire to it, which I now believe to be *R. incerta* Déségl., a species to which var. *Nicholsoni* makes a considerable approach, when the peduncles are smooth or almost so. I have a note that a Surrey plant (*Britton*) may perhaps belong here, but have no specimen in my herbarium, so the doubt must remain. V.-c. 17?, 65.

[*R. arvatica* "Pug." Baker, Monogr. p. 229. I think it best to exclude this name. Baker's plant was certainly not Puget's, and as the latter is (wrongly) kept up on the Continent to cover the plant Puget had in his mind, confusion would only result in the adoption of the name to cover a different plant in Britain. Moreover, I have seen no British plant so labelled that cannot be referred elsewhere, usually to *R. agrestis* var. *subcuneata* Rouy. There are, however, forms with too few subfoliar glands for the *Agrestis* group, which may be placed under either *R. sclerophylla* Scheutz, *R. tomentella* var. *Nicholsoni* Chr., or *R. caryophyllacea* Chr.]

R. CARYOPHYLLACEA Chr. forma (non Bess.) Ros. Schw. p. 122. Two specimens from Catsworth, Hunts (*Ley*), are considered by Dingler to agree almost exactly with a form of this species, which he believes may be a hybrid with some *Rubiginosa* form, but to which he has given the name of *R. tomentella* var. *anonyma* (ined.) in his herbarium. The form is characterized by the leaflets having an unusual number of subfoliar glands for the group, also slightly hairy midribs, slightly glandular peduncles, ovoid fruit and hispid styles, but its marked peculiarity is the development of short, fine glandular setæ or acicles on some portions of some of the flowering branches. The Catsworth specimens are less extreme than the continental ones Dingler has sent me, having less glandular leaflets and peduncles, and one of them has no glandular development on the flowering branches. Sudre confirmed my suggestion of *R. Blondæana* for one of them (in spite of slightly hairy midribs), but labelled the other *R. canina* var. *senticosoides* Rouy. I think specimens from Ellington brickfields, Hunts (*Ley*), Hanwell, Oxon (*Druce*), and from Geddington Chase and Wadenhoe, Northhants (*Ley*), also belong here. Specimens from the two latter stations have been distributed through the Exchange Clubs by the late Mr. Ley as *R. Borreri*, but the Wadenhoe gathering was certainly a mixture of at least two forms, one of which belonged to the *Deseglisei* subgroup. V.-c. 23, 31, 32.

[*R. Friedlanderiana* Bess. Enum. Pod. & Volh. p. 63. Another Hunts specimen (*Ley*) runs down exactly to this by Keller's synopsis. Sudre labels it *R. rubiginosa* var. *subapricorum* Rouy, but Dingler confirms my suggested name, though he thinks the specimen more glabrous than Besser's species. Except that its midribs appear quite glabrous, it seems to me to be identical with the specimens of *R. caryophyllacea* gathered by the late Mr. Ley; its stems are even more densely aciculate. If Besser's plant is really a *gallica* hybrid, as is generally supposed, its occurrence in Britain is improbable, except from a garden origin. V.-c. 31.]

Leaflets Uniserrate.

R. obtusifolia Desv. Journ. de Bot. ii. p. 317. I think, after seeing growing bushes of this, which I had not seen when I wrote my paper on the *Eu-caninæ*, that it must certainly go to the present group. To so place it would be quite in accordance with my views that species which *look* alike should be associated, though their technical points may differ. The resemblance is so great that I cannot distinguish *R. obtusifolia* in the field from *R. tomentella* without examining the leaf serration. My former views as to its classification have been strengthened by what I now believe to be the misnaming of many examples of the *Dumetorum* group by Sudre and by British authors. It is a frequent species, at least in Surrey, and I have little doubt that its distribution is general. *R. canina* var. *frondosa* Baker is synonymous. V.-c. 2, 3 ?, 4 ?, 17, 34, 36, 40 ?, 58 ?.

R. canina var. concinna Baker, Monogr. p. 233. Since writing my former paper (E. p. 83) I have seen Baker's type in Borrer's herbarium. It is from South Devon, and is in all respects like *R. obtusifolia*, but with hispid peduncles. I have not seen it from elsewhere. V.-c. 3.

SUBSECTION VILLOSÆ.

This subsection is our most difficult one, not so much in segregating the species, which is difficult enough even when the group is known, but in assigning a very large proportion of herbarium specimens to their proper group. In the growing plant the habit may be useful, but in most cases the behaviour of the sepals on the ripe fruit is indispensable. In addition to this fundamental uncertainty, the aggregate nature of some of our old species, such as *R. mollis* Sm., *R. Sherardi* Dav., *R. tomentosa* Sm., &c., is a source of trouble; moreover, the British treatment of the subsection is on different lines to that followed on the Continent, so that the names cannot be correlated. It would appear, also, that the subfoliar glandular development is of much less importance in this than in the *Eu-caninæ*. I scarcely know any species in which examples cannot be found which are similar to one another in all respects, but some have a full and conspicuous clothing of subfoliar glands, which in others is almost or quite absent. Much the same remarks, though to a less degree, apply to the curvature of the prickles and shape of the fruit.

I am greatly indebted to Mr. Barclay and to the late Mr. Ley for a considerable supply of specimens and notes, without which my knowledge of the subsection would have been indeed meagre.

GROUP POMIFERA.

SUBGROUP POMIFERÆ.

If this subgroup can be separated from that of *Molles* at all, it is by its thin, large leaflets, but typical *R. pomifera* has, on the Continent, a whole series of varieties, which closely connect the two subgroups.

R. POMIFERA Herrm. Dissert. Ros. p. 16. I have no specimen of the typical plant in my herbarium, but I do not think that *R. recondita* should be separated, except perhaps varietally. V.-c. 80, 106.

[*R. recondita* Pug. in Déségl. Rev. Tom. p. 46. This seems to be nothing whatever but a form of *R. pomifera* with more subfoliar glands than usual. By description its leaflets are smaller, but Déséglise does not lay stress on this to distinguish the two. I doubt if it is even varietally distinct. My own specimen of the Deal plant (see B. R. p. 57) has quite as many subfoliar glands as that from Gloster. V.-c. 15, 34, 77?, 91, 98.]

R. GRENIERII Déségl. Ess. Monogr. p. 128. This species may be said to cover examples that are intermediate between *R. pomifera* and *R. mollis*, and though I follow the continental practice of classifying it near *R. pomifera*, authentic specimens look to me nearer *R. mollis*. Probably this is a case where the habit would decide. Ley's "*R. pomifera*" from Brecon is placed here by Sudre and Dingler, and I suspect much of the Scottish *R. mollis* might be referred to it. V.-c. 42, 62.

SUBGROUP MOLLES.

R. MOLLIS Sm. E. B. tab. 2459. As with *R. pomifera*, this species can be segregated into forms without subfoliar glands, which constitute the type, and forms with the glands numerous and conspicuous, which seem to me much commoner than I supposed when I wrote my *British Roses*. I have not yet got any continental name for the latter form which Ley used to call "glandular *mollis*." V.-c. for type, 62, 64, 70, 75, 79, 80, 83, 95; and for "glandular *mollis*," 65, 69, 70, 78, 90, Perth.

R. MOLLIS var. CŒRULEA Woods, in Trans. Linn. Soc. p. 192 (sub *R. villosa*). This is not separable either by description or by author's specimens by any hard and fast line from the type, both fruit and peduncles having permissibly some glandular setæ. Moreover, I have seen bushes, and Mr. Barclay says they are frequent, on which both smooth and glandular fruit and peduncles occur. My records include specimens with a few glands on peduncles or on the upper part of fruit, only one or two having both quite smooth. Ley considered the variety to run very close to *R. omissa*, and Sudre has placed one or two examples of it to that species. The W. Sutherland examples (*Marshall*) are suggestive of *R. villosa* var. *cœrulea* × *R. suberecta*. V.-c. 36, 42, Yorks, 69, 74, 79, 88, 92, 108, Inverness, Antrim.

R. PSEUDO-RUBIGINOSA Lej. Fl. Spa, p. 229 (*R. arduennensis* Crép.). This is hardly separable from "glandular *mollis*," unless it be by its long and straight prickles, and even more glandular leaflets, very often glandular on both surfaces. The leaflets also are smaller, narrower, and darker in colour, and by description should be subglabrous, but Crépin says he places little reliance on the amount of hairiness, which makes its segregation from "glandular *mollis*" even more difficult. V.-c. 62, 69, 79, 89.

GROUP OMISSA.

The difficulties of this group do not end with its limitations. Its species are distinguished from one another on paper mainly by the presence or absence of subfoliar glands, by the curvature of the prickles, and by the shape of the fruit. The first character is a very unstable one in the whole of this subsection, and although a broad distinction may be made between straight, falcate, and hooked prickles, the intermediate stages are far too numerous, and I doubt the propriety of placing much reliance on their form. The shape of the fruit is, at least in the other subsections, of great importance, yet one is compelled in some cases to associate very different forms of it. There is great difficulty in comparing our forms with the continental ones, from the fact that six of our ten names are those of British authors, and only one of these is recognized on the Continent at all, viz. *R. Sherardi* Dav. (under the name of *R. subglobosa* Sm.), and that is regarded as a *Tomentosa* form. As I have elsewhere stated, I doubt whether the relative persistence of the sepals is a satisfactory primary character for segregating the group. For reasons given under the group *Tomentella*, I prefer to call the present one *Omissa*, though I have taken a wider view of it than is taken on the Continent. It cannot be conveniently divided into subgroups.

R. OMISSA Déségl. in Billotia, p. 47. The fruit of this, according to description, should be obovoid-pyriform, but to judge from Déséglise's own specimens it is subglobose, only the middle one in each cluster of three being somewhat produced at the base into the petiole, but hardly pyriform. The prickles are slightly curved, hardly falcate, but seldom quite straight. The sepals remain till the fruit is ripe or nearly so. The peduncles vary in length up to that of the fruit; our forms seldom have their peduncles shorter than the fruit, which is also more often subglobose than pyriform, so that they can with difficulty be distinguished from *R. resinosoides*. A white-flowered form is found in Perthshire, but normally the flowers are deep rose. V.-c. 42, 55, 88, 96.

R. RESINOSOIDES Crép. ex Cott. Bot. Cant. Frib. p. 168. This may be regarded as a long-peduncled form of *R. omissa*, with the leaflets often less hairy and more glandular, giving them a rough feeling like those of *R. scabriuscula*, but softly pubescent forms are nearly as frequent. I am doubtful whether forms with very few subfoliar glands are correctly referred here. The fruit in my specimens varies from subglobose to obovoid-ellipsoid. Specimens with the latter form of fruit were distributed through the Watson Bot. Exch. Club in 1908 by Mr. Barclay, labelled *R. tomentosa* Sm. var., *viz.* his Nos. 10, 16, 20, and 24. They are, of course, much off type, and Crépin denied the identity of at least one of them with his species, but I know no other suitable name. The Hereford specimen is very near *R. mollis*, its sepals persisting on the ripe fruit; it has much the look of var. *submollis*, but its leaflets are very glandular beneath. White-flowered forms occur. V.-c. 17, 36, 43 ?, 58, 62, 65, 78 ?, 79 ?, 80, 88, 89, 92 ?, Antrim, Down, Mayo ?.

R. SHERARDI Davies, Welsh Bot. p. 49. Though typically the fruit of this species should be globose or almost so, several of Smith's own specimens have it quite ovoid. Thick, densely, softly tomentose leaflets, eglandular beneath except sometimes on primary nerves, often subsimply toothed, and rather stout, falcate prickles, are its leading features. Continental authors place it, under the name of *R. subglobosa*, in the *Tomentosa* group, but if there is anything in the persistence of the sepals, it belongs to the present one, though just similar forms occur with the sepals deciduous, which belong to the next. The species is probably much commoner than the following records show. The S. Devon example was referred to *R. tomentosa* var. *leiocarpa* Boullu by Sudre. V.-c. 3, 8, 15, 16, 17?, 31, 34, 40, 43, 58?.

R. OMISSA var. SUBMOLLIS Ley, in Journ. Bot. 1907, p. 205. This is very near its neighbours on either side. I do not place very great reliance on the absence of subfoliar glands—indeed, the hairs so often conceal them that it is difficult to say whether they exist or not; thus the chief distinction from *R. resinosoides* is lost. The prickles in this and the neighbouring species vary by insensible gradations from straight to hooked, so that it is impossible to draw the line between var. *submollis* and *R. Sherardi* or var. *pseudomollis*. If it can be segregated at all, specimens from the following vice-counties may be referred to it. V.-c. 23?, 35, 36, 40, 43, 70, 88, 98, Antrim, Armagh?.

R. TOMENTOSA var. PSEUDOMOLLIS Baker fil. in Journ. Bot. 1892, p. 341. I can see no difference in specimens referred by Ley to this variety and to var. *submollis*. By his key, var. *pseudomollis* differs in little but its falcate prickles, but specimens with quite falcate and stoutish prickles have been referred by him to var. *submollis*. The type specimen shows that var. *pseudomollis* may have some subfoliar glands on some of its leaflets, those of var. *submollis* being always eglandular, but this is a weak distinction. The Boar's Hill plant (Bot. Exch. Club. Rept. 1893) is just as near var. *uncinata*, to which Ley referred it. V.-c. 20, 22, 36, 42, 43, 80.

R. TOMENTOSA var. UNCINATA Lees, in Rept. Bot. Record Club, 1884–1886, p. 123. This variety stands at the end of a practically unbroken series from *R. resinosoides*, or at least from *R. Sherardi*, and though no doubt fairly distinct forms may be found among them, they seldom agree with any of the described ones. It would seem best to reduce var. *submollis*, var. *pseudomollis*, and var. *uncinata* all to varieties of *R. Sherardi* Dav. Var. *uncinata* is too close to var. *pseudomollis*, differing only in some of its prickles being quite hooked and rather stout, though not large, which give it a *Coriifolia* look. I have, however, specimens from Llys-y-Gwynt, as well as of var. *pseudomollis* from Cowleigh Park, their respective original stations, and it is difficult to see how they differ, except in unimportant details. My specimens were labelled *R. tomentosa* var. *serotina* Coste by Sudre. V.-c. 36?, 40, 42, 49.

[*R. farinosa* Bechst. Forstbot. 1, p. 243. I can add nothing to my remarks in B. R. pp. 84–86, except to say that I have seen specimens from Selkirk (*Druce*) and Surrey (*Marshall*), which might possibly belong here, but there is so much doubt as to what the species really is, as well as to the identity of the Blair Atholl specimen with it, that it is best excluded. My specimen of Ley's Mardale, Westmorland, plant (Rept. Bot. Exch. Club, 1910, p. 559) has smooth peduncles and calyx-tube, but is much too young to determine even the group.]

R. SUBERECTA Ley, in Journ. Bot. 1907, p. 206. As defined in my notes in B. R. pp. 81–82, this is a well-marked species, though I still doubt its identity with Woods's *R. villosa δ suberecta*, the points of resemblance being of much less importance than those of difference. Ley's specimens shade off on one side to forms with subglabrous leaflets, and on the other to forms with them more softly densely grey-tomentose, usually, though not always, accompanied by more subglobose fruit, and less pinnate, more erect sepals. Dingler concurs that some of these may be *R. suberecta* × *mollis*. Ley's Hartsop, Westmorland, specimens (Bot. and Wats. Exch. Clubs, 1910) are much off type, but may possibly belong here. His Naddle Forest specimens are intermediate. Sudre labels all the specimens he has seen *R. villosa* (*pomifera*) var. *vogesiaca* Rouy, a diagnosis from which Dingler strongly dissents, but thinks they show some resemblance to *R. tomentosa* var. *venusta* Scheutz. V.-c. 49?, 56?, 59?, 62, 67, 69, 78, 79, 92, 105, 106, 108, Londonderry.

R. SUBERECTA var. GLABRATA Ley (*l. c.*). The leaflets in this may be quite as glandular as in the type, or glandular on primary nerves only. I include a very thinly hairy form from W. Ross, but have a quite glabrous form from there also. Sudre referred the slightly hairy one to var. *vogesiaca* Rouy, and the glabrous ones to *R. Jundzilli* var. *trachyphylla* Rau, which Dingler thinks an impossible diagnosis. As with the type, a white-flowered form occurs; normally they are a deep rose. V.-c. 97, 105, 106?.

R. SUBERECTA × MOLLIS. I have mentioned these forms under *R. suberecta*. Some of them have smooth peduncles and fruits, and run very near, or may even be, var. *cœrulea*. These latter forms all come from Inchnadamph, W. Sutherland (*Marshall*). A white-flowered form also occurs. V.-c. 105, 106, 108.

R. SUBERECTA × CORIIFOLIA ?. An E. Ross plant (*Marshall*) may be this, which suggestion Dingler thinks perhaps correct. It has grey-green, nearly eglandular leaflets, which are simply and shallowly serrate, also quite falcate prickles. The petiole armature, fruit, and sepals are just those of *R. suberecta*, but the armature of the fruit and peduncles consists of close-set, stout, eglandular acicles, such as *Villosæ* hybrids seem disposed to produce. Sudre thought it probably *R. dumosa* Pug., but Dingler says he sees no resemblance except in its simple serration.. V.-c. 106.

R. TOMENTOSA var. WOODSIANA H. & J. Groves, in Rept. Bot. Exch. Club, 1880, p. 31. I can add nothing to my notes in B. R. pp. 80–81. V.-c. 17, 32.

R. CINERASCENS Dum. Fl. Belg. p. 93. I have seen no further specimens referable to this species beyond those mentioned in B. R. p. 84. My specimen of Mr. Barclay's no. 37 may not be characteristic of the whole gathering, but as three out of its four fruits have respectively 3, 1, and 0 sepals on Sept. 5th, before it has even begun to colour, I fail to see how it can belong here, since Dumortier says "sepals persistent till fruit ripens." It also has the ovoid fruit and villous styles of *R. dumosa* Pug., to which I would certainly have referred it, but as it has been passed by Crépin, Dingler, and Sudre, it ought to be accepted. V.-c. 39, 57, 88.

GROUP TOMENTOSA.

Most of the remarks as to the difficulties of the last group apply to this one also. At the outset, we have the relative persistence of the sepals, which is usually undeterminable from herbarium specimens; moreover, as continental botanists admit suberect and persistent sepals into it, comparison with their forms becomes more difficult. Further remarks are made under each species.

SUBGROUP TOMENTOSÆ.

The division into subgroups is not satisfactory, but on the whole the members of this subgroup have more woolly styles, and more densely tomentose leaflets, than those of the next; the style characters being those I place most reliance on. The subgroup consists mainly of forms of the first three of the following species.

R. TOMENTOSA Sm. Fl. Brit. ii. p. 539. I am still of opinion that this name is best used as an aggregate only, covering examples referable to both subgroups, since Smith certainly included forms of *R. fœtida* in it as well as forms with erect persistent sepals. As it is, it merely represents a residue after segregating all the forms capable of segregation to later described species and varieties. I am unable to define it better, and my records only refer to such residue. The resulting mixture, however, seems to be no worse than that of the segregates. The species, as an aggregate, thins out greatly in the southern counties, but is no doubt generally distributed. V.-c. 17, 23, 27, 40, 55, 58, Perth.

R. PSEUDO-CUSPIDATA Crép. in Bull. Soc. Roy. Bot. Belg. xi. p. 89.* This is the plant formerly erroneously referred to *R. cuspidata* M. Bieb. It may be taken to cover those forms of the subgroup with softly pubescent leaflets, more or less glandular beneath, straightish prickles, whitish flowers, ovoid fruit, and hispid styles. Examples run into *R. cuspidatoides* and *R. tomen-*

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* See British Roses, p. 91.

tosa, and some bear a close resemblance to *R. fœtida*, except for their quite hispid styles. The specimens in my herbarium are somewhat heterogeneous, and have been referred by British authorities to *R. tomentosa* Sm. (this is the only one seen by Dingler, who concurs in naming it *R. pseudo-cuspidata*), *R. britannica* Déségl. (the only one seen by Sudre, who names it *R. Annesiensis* Déségl.), var. *sylvestris* Woods, var. *submollis* Ley, *R. Lucandiana* Déségl. & Gill., *R. resinosoides* Crép., *R. cuspidatoides* Crép., and *R. Sherardi* Dav. V.-c. 2, 3, 15, 16, 17, 22, 23, 36, 40, 62, 65, 69.

R. CUSPIDATOIDES Crép. in Bull. Soc. Roy. Bot. Belg. xxi. p. 94. This is distinguished from the last by its broader leaflets, bright rose flowers, globose fruit, and more woolly styles. The leaflets may be a little more glandular beneath, and the prickles more falcate, but these points are not well marked in the specimens I have seen. The specimen from Salop was labelled *R. omissa* var. *submollis* by Ley. V.-c. 39, 40, 64, 65, 69.

[*R. tomentosa* var. *globulosa* Rouy, Fl. Fr. vi. p. 386. This name has been applied by Sudre to several examples characterized by very long peduncles and globose fruit, but with reflexed sepals. I think there must have been some mistake, because Rouy says his variety is synonymous with *R. Andrzeiovii* Déségl. non Bess., and should have spreading-erect sepals. I have no examples in my own herbarium, and kept no records of those I saw in that of the late Mr. Ley. Mr. Ley thought it a suitable name to cover the *Sherardi*-like plants belonging to the *Tomentosa* group, but that would be a misapplication of Rouy's name, which is intended to cover some form of the *Omissa* group, not that of *Tomentosa*.]

[*R. dumosa* Pug. in Déséglise, Rev. Sect. Tom. p. 40. This corresponds in this group to *R. cinerascens* in that of *Omissa*, but besides its deciduous sepals, its leaflets are larger and not quite uniserrate, its fruit also is ovoid, and its styles villous, but forms exist having these features, with more or less persistent sepals, while forms with quite deciduous sepals have the other features of *R. cinerascens*. A Hunts specimen (*Hunnybun*) has quite globose fruit and subglabrous styles, but all the sepals had fallen by Sept. 25th, and its other features are those of this species. It requires confirmation as a British species.]

SUBGROUP FŒTIDÆ.

This subgroup contains examples with glabrous or subglabrous, rarely quite hispid styles, and usually with leaflets less hairy beneath. Their peduncles are almost always long, at least half as long again as the fruit, or more, but long-peduncled forms are often found in the last subgroup, so that this character is not a very distinctive one.

R. SCABRIUSCULA Smith, E. B. t. 1896. This species should be confined to examples which have their leaflets subglabrous or only thinly hairy beneath, so as to be roughish to the touch, though they should be eglandular. Their shape is variable, but as a rule they are long in proportion to their width, and they are rather large. The prickles should be straightish and subulate, and the styles subglabrous. Specimens with more hairy leaflets are probably referable to *R. confusa*, and if they have subfoliar glands, or at any rate more than a few inconspicuous ones on the primary nerves, they must be referred elsewhere. Sudre regards both Rouy's varieties of *R. tomentosa*—var. *normalis* and var. *ovoidea*—as covering *R. scabriuscula*, but the former has some of its leaflets more or less glandular, while the latter has rising sepals, so neither is a very satisfactory synonym. V.-c. 3, 5, 6, 23, 34, 49, 58, 67, 78.

R. FŒTIDA Bast. Ess. Fl. Maine & Loire, Suppl. p. 29. This differs from *R. scabriuscula* in its leaflets being decidedly glandular beneath, and usually more hairy and broader. The styles also are more constantly glabrous. I think it is as common in Britain as *R. scabriuscula*, even if the latter be made to include *R. confusa*. My No. 1447, B. E. C. Rept. 1906, p. 222, is, I think, best referred to *R. scabriuscula*. V.-c. 2, 3, 11, 14, 16, 17, 24, 32, 34 ?, 53, 58, 62, Cork.

R. CONFUSA Pug. ex Déségl. Cat. Rais. p. 319. Though I have no confirmation from Sudre or Dingler (who have not seen any of the specimens I place here), I think this name must be adopted for the more softly hairy-leaved plants usually referred to *R. scabriuscula*, but which Ley always dissented from. In addition, the sepals should be more erect and subpersistent, but I find this character does not always go with more pubescent leaflets. Otherwise the species is closely allied to *R. scabriuscula*. Ley labels all his specimens *R. tomentosa*, from which their glabrous styles should always distinguish them. His Cowleigh, Hereford, specimens (Bot. Exch. Club Rept. 1910, p. 539, and Wats. Club Rept. 1910) belong here. V.-c. 34, 36, 40, 50.

R. TOMENTOSA var. SYLVESTRIS Woods, in Trans. Linn. Soc. xii. p. 202. This is intermediate, in so far as its leaf clothing is concerned, between *R. scabriuscula* and *R. fœtida*, having them subglabrous, as in the former species, but glandular, as in *R. fœtida*. The prickles are, as a rule, more falcate or even uncinate, and its styles often somewhat hispid. It is not mentioned by any foreign author, and is probably included in *R. fœtida*, though var. *Arrondæana* Rouy must be very near it, and is the name given by Sudre to the only specimen he has seen, from Hereford (*Ley*). Dingler also has only seen one, from Cheshire, which he labels *R. fœtida*. British authors have referred plants I place here to *R. cuspidatoides*, *R. pseudo-rubiginosa* (the name Ley gives to two remarkably small-leaved examples from Surrey and W. Kent, certainly not that species, and only provisionally placed here as very aberrant forms), *R. scabriuscula* and *R. tomentosa*. V.-c. 4, 16, 17 ?, 23, 36, 40, 43, 58, 79.

R. JUNDZILLIANA Baker, Rev. p. 21. Though this name must not be retained permanently, I use it until I am in a better position to revise the British genus, to cover the remarkable plant from Cheshire mentioned in B. R. p. 96, which is closely matched by one I have seen from Northants (*Ley*), but I have no specimen of the latter, nor any detailed notes. V.-c. 32, 58.

SUBSECTION RUBIGINOSÆ.

This subsection is distinguished from our other British ones primarily by the abundance and size of its subfoliar glands. Exceptional cases may be found where the glands are very few, and these might be mistaken for members of the *Villosæ* subsection or the *Tomentella* group, or *vice versa*, but the scent of the foliage, and in most cases the habit, armature, and other characters help to a solution.

GROUP EGLANTERIA.

The stiff, erect, though usually low-growing habit and hispid or villous styles almost always mark this group. The sepals also are more or less persistent, and usually suberect, and the armature much more often mixed than in the groups of *Micrantha* or *Agrestis*. From the group *Elliptica* its hispid peduncles and roundish leaflets distinguish it.

R. EGLANTERIA Linn. Sp. Pl. ed. 1, p. 491. For reasons given in B. R. p. 101, this name can only be used as an aggregate. I have records for it as such from v.-c. 74, 79, and Somerset.

R. APRICORUM Rip. ex Déségl. Cat. Rais. p. 279. This is not well differentiated from *R. comosa*, and can, I think, only be separated by its globose fruit and less persistent sepals. The difficulty is, as with the group *Omissa* in the *Villosæ*, to determine the ultimate direction and persistence of those organs in average herbarium specimens, which are often gathered too young. Uniform, stout, hooked prickles, often with acicles just below the inflorescence, are common to both species. Two of my Halling specimens, referred to in Fl. Kent, p. 135, as *R. permixta*, belong here, though they are abnormal in having a considerable admixture of acicles in some parts of their stems. They certainly are not *R. permixta*. Marshall's No. 1238 belongs here also, as a small-leaved form towards var. *rotundifolia*, but differing in its strong, hooked prickles. The distribution is far more general, at least on chalky soils, than the following records show. V.-c. 15, 16, 17, 32?, 80.

R. COMOSA Rip. in Sch. Arch. Fr. & All. p. 254. The bulk of our *R. Eglanteria* Linn. is, I believe, referable to this segregate. It is certainly far the commonest form on Box Hill and the adjacent downs, and appears to be the commonest species on the Continent. It is recognizable by its stout, uniform, hooked prickles, with acicles just below the inflorescence, ovoid fruit, and persistent though not always very erect sepals. Globose fruit is sometimes found on the same bush as ovoid, but the latter is the normal shape. V.-c. 3, 9, 16, 17, 79, 80, 98.

R. COMOSELLA Déségl. & Ozan. in Bull. Soc. Dauph. p. 327. This may be regarded as a form of *R. comosa* with smaller oval leaflets, and more numerous, slender, straighter prickles. Its fruit is ovoid. It runs very near var. *rotundifolia*. It is a common form on Box Hill. V.-c. 17.

R. RUBIGINOSA var. ROTUNDIFOLIA Rau, Enum. Ros. p. 136. Known by its small suborbicular leaflets, rarely more than ½ in. long, straightish or somewhat falcate slender prickles, and subglobose fruit. V.-c. 3, Somerset, 16, 17, 62, Northumberland?.

R. ECHINOCARPA Rip. ex Déségl. Ess. Monogr. p. 110. This has a mixed armature of very numerous prickles, the larger ones being hooked though not stout. The fruit also is aciculate, usually strongly so. I have seen no further specimens than those mentioned in B. R. pp. 106, 107. Groves's No. 38 is no doubt *R. comosa*. V.-c. 17, Perth.

R. GREMLII Chr. ex Grem. Exc. Fl. Schw. ed. 2, p. 176. I think Barclay's Caputh specimen (Wats. Exch. Club Rept. 1907–8, p. 143) must be referred here, though it is not typical, and may be only a white-flowered form of *R. echinocarpa*. Uniform, long, slender, hooked or falcate prickles, yellowish-green foliage, longish styles, and white flowers are the leading characteristics of the species. Sudre named the example that was sent to me "near *R. echinocarpa*, but with small leaflets." Dingler says he sees no resemblance to that species, though he does not give it a name. V.-c. 89.

R. JENENSIS M. Schulze in Mittel. Geogr. Gesell. Thur. Jen. iii. p. 79. No specimen other than that mentioned in B. R. pp. 108–9 has come to my notice. V.-c. 15.

GROUP MICRANTHA.

Usually known from the *Eglanteria* group by their glabrous styles, its members have as a rule a much laxer habit, like that of most of the *Eu-caninæ*; their sepals are reflexed and deciduous, and the fruit always narrowed at the apex, rather than at the base. In most species the prickles are uniform, but occasionally a mixed armature is seen, generally just below the inflorescence, as is frequent in the *Eglanteria* group, though sometimes also on the main stem.

R. MICRANTHA Sm. E. B. tab. 2490. The bulk of our plants belong to this species or the next. It is generally easily recognized, but it varies considerably in shape and size of leaflets and fruit, and our forms are probably capable of segregation. I have it from Cheshire with numerous acicles just below the inflorescence, but with smooth fruit, which, however, is much too ellipsoid for var. *trichocarpa*. Dingler named this form var. *microcarpa* Kell., which it certainly resembles, but Sudre thought it just *R. permixta*. A form with larger, rounder, more hairy leaflets occurs near Hindhead, Surrey, which may be *R. septicola* Déségl., but it is connected by intermediate forms with the type. The distribution of the species is much more general than that of *R. Eglanteria* (agg.), but I only cite vice-counties from which I have actually identified it, or have records of it by good authority, though I cannot always distinguish it from *R. permixta*. V.-c. 11, 13, 14, 17, 26?, 32?, 58, 80.

R. PERMIXTA Déségl. Ess. Monogr. p. 107. This is very near the last, and when it is considered how much all species are liable to vary, it ought to be regarded as no more than varietally distinct, and often is not separable at all. I think perhaps that most of our *R. micrantha* might be referred here, and it certainly is the commoner species on the Continent. Less hairy leaflets, and more prickly flowering branches, with the fruit more constantly smooth, are about the only tangible differences. None of the specimens referred to in Fl. Kent, p. 135, belong here. Some have been placed to *R. apricorum*, and others will be mentioned under var. *trichocarpa*. There is, however, little doubt that both *R. micrantha* and *R. permixta* may be found all over the chalk range, as well as in many other counties in the kingdom. V.-c. 3, 5, 17, 22, 34, 55.

R. MICRANTHA var. TRICHOCARPA Rouy, Fl. Fr. vi. p. 363 (non Boullu). This name has been applied by Sudre to a Surrey specimen with acicles on the flowering stem just below the inflorescence, and also a very few on the main stem, accompanied by a more broadly ovoid, hispid fruit. Except for the broadly ovoid fruit, it might be regarded as a somewhat aciculate-stemmed *R. micrantha*. Another gathering, with a strongly aciculate stem, which I thought might be *R. micrantha* × *Eglanteria*, is referred by Sudre to *R. micrantha*, but it seems to agree very well with the last named. One of the Upper Halling plants and that from Boxley, referred to on p. 135, Fl. Kent, as *R. permixta*, are best referred here, though their fruit is quite ellipsoid. Rouy's variety is not synonymous with that of Boullu, as the former author states. Cariot's description in Études des Fleurs, ed. 8, p. 278, makes var. *trichocarpa* Boullu a mere variety of *R. micrantha* having subglobose hispid fruit, and does not mention acicles on the stem. V.-c. 15, 16, 17.

R. HYSTRIX Lém. in Bull. Sc. Soc. Phil. Paris, p. 95. Small, elliptical leaflets, wedge-shaped at the base, are the chief feature of this species. It should also have hooked prickles and subglobose fruit. I have not seen typical examples from Britain, Déséglise's specimens being both so untypical as to have been wrongly referred here, I think. A Dartford, W. Kent, specimen is nearer the type, as also are two from Leatherhead, one of which was named *R. parvula* Gren. and the other *R. diminuta* Bor. by Sudre. V.-c. 16?, 17?, 80?.

R. MICRANTHA var. BRIGGSII Baker, Monogr. p. 222. This variety still seems to be confined to the neighbourhood of Plymouth. V.-c. 3.

R. SYLVICOLA Déségl. & Rip. in Mém. Soc. Ac. Maine & Loire, xxviii. p. 122. I have seen no further specimens of this beyond those mentioned in B. R. p. 121. V.-c. 27 ?, 31.

GROUP ELLIPTICA.

The members of this group correspond to those of the *Eglanteria* group in their erect, compact growth, and more or less spreading-erect, subpersistent sepals, but differ essentially in their leaflets being decidedly wedge-shaped at the base, and their peduncles smooth; their styles also are usually more hairy or villous.

R. BILLIETII Pug. ex Crép. Prim. Monogr. i. p. 337. This is distinguishable from the next by its more hairy and more glandular leaflets, ovoid fruit, and less villous styles. I think the Brean Down plant referred to under *R. inodora* Fr. in B. R. pp. 125–7 comes very near this on account of its densely hairy styles and other characteristics, though it has not hairy peduncles, which is, however, not a character of much constancy in the genus, moreover, the Bridport specimen of *R. Billietii* has them glabrous. V.-c. 6 ?, 38.

R. CRYPTOPODA Baker, Rev. p. 22. I have seen none but the Luddenden specimen of this, but not only is there some uncertainty as to whether that specimen really represents *R. cryptopoda*, but it is doubtful whether that species is correctly referred to this subsection (see B. R. p. 112). V.-c. 63 or 64.

GROUP AGRESTIS.

This bears the same relation to the group *Micrantha* that *Elliptica* does to *Eglanteria*, in its members having their leaflets decidedly narrowed at both ends, and smooth peduncles. Their tall lax habit and glabrous styles resemble the *Micrantha* group. Next to that of *Elliptica* it is our rarest group, and only occurs in a few of the southern and western counties.

R. AGRESTIS Savi, Fl. Pis. p. 475. Though I have kept this distinct in my *British Roses* from *R. sepium* Thuill., I think it is more satisfactory to unite them, *R. sepium* being only a larger form. It appears to be quite rare in Britain, most of our forms of the group having larger leaflets, even than *R. sepium*, and more or less pubescent instead of quite glabrous, as in the type. A specimen from N. Somerset (*Marshall*) may be placed here. It was referred to var. *elegans* Rouy by both Sudre and Dingler, presumably on account of some apparent hairiness of the leaflets, but the hairs consist of thistledown and sheep's wool, the leaflets being really quite glabrous. A specimen from S. Hants (*E. F. Linton*) also probably belongs here, the leaflets being all but glabrous, though they are as large and broad as is usual in var. *subcuneata*. There is also the Puttenham, Surrey, plant (*Groves*), which may possibly belong to the type, some of the specimens having almost glabrous leaflets, but it is not certain that all the gatherings do not come from the same bush, the bulk of which is referred to var. *subcuneata* Rouy. V.-c. 6, 11, 17?.

R. SEPIUM var. PUBESCENS Rap. Cat. Pl. Vasc. Gen. p. 73. This name is used by Keller at the head of a subgroup of *Agrestis* containing the hairy-leaved species, and would no doubt include *R. agrestis* vars. *subcuneata* and *elegans* Rouy, which he does not mention. It appears to be distinguished mainly by its large hairy leaflets and ovoid fruit. I keep the name for the E. Sussex specimen (*Jenner*) mentioned on pp. 128–9 in B. R. V.-c. 14.

R. AGRESTIS var. SUBCUNEATA Rouy, Fl. Fr. vi. p. 351. This name is given both by Dingler and Sudre to one of the gatherings of Messrs. Groves at Puttenham, Surrey. Rouy distinguishes his variety from all the others in the group, except *R. arvatica* Pug., by its leaflets being of medium size and more or less hairy beneath, separating it from *R. arvatica* by its narrower leaflets and fruit, which latter is ovoid or ellipsoid, that of *R. arvatica* being broadly ovoid or subglobose. The Puttenham plant was referred by Déséglise to *R. arvatica* Pug., but since Puget's description, though written, was never published, his name cannot stand. V.-c. 15, 17, 24, 49, Co. Westmeath, Lough Dearg.

R. BELNENSIS Ozan. in Bull. Soc. Dauph. p. 326. This is very near var. *subcuneata*, but has quite globose, rather larger fruit. Besides the Uphill gathering, specimens from near Witley, also at Hammer Ponds, Surrey, must be referred here, but the Llandudno example (B. R. p. 128) is best under var. *subcuneata*. V.-c. 6, 14?, 15, 17.

[*R. inodora* Fr. Novit. p. 9. The Brean Down plant (B. R. p. 125–7) must, after all, be excluded from this group, its styles being far too hairy. It is best under *R. Billietii*.]

LIST OF SPECIES AND VARIETIES.

The following list recapitulates the above species and varieties in a tabular form. The "included" species and varieties are those of which the names have been applied by British or foreign botanists to British examples which appear to me to be too near for segregation from the species which include them. I have not retained the oldest names, but those which our plants seem to fit best, so that the "included" names may, for the present, be regarded as synonymous with their superspecies, though, of course, they are not all necessarily technically so.

The numbers following each species or variety indicate the number of vice-counties from which I have personally seen specimens. A second number followed by a ? indicates those in which there is considerable doubt as to the name. These latter are additional to the accepted vice-county records.

As already explained, I have not ventured to revise the nomenclature, so I have given the list without any expression of opinion as to the relative value of the names therein, whether as species, varieties, or forms.

SECTION SYNSTYLÆ.

GROUP ARVENSIS.

R. arvensis Huds. (6)
,, var. *major* Coste (5)
including *R. bibracteata* Bast.
R. ovata Lej. (6)
R. arvensis var. *scabra* Bak. (2)
,, ,, *biserrata* Crép. (1)
including var. *reptans* Crép.
R. erronea Rip. (3)
R. Melvini Towndr. (1)
R. gallicoides Déségl. (3)
R. arvensis × *stylosa* (1)

SECTION STYLOSÆ.

GROUP STYLOSA.

R. stylosa Desv. (4)
including
var. *Desvauxii* Bak.
R. corymbifera Borkh.
R. stylosa var. *corymbosa* Desv. (2, 1 ?)
including var. *opaca* Bak.
R. systyla Bast. (18)
,, var. *lanceolata* Lindl. (1, I)
R. leucochroa Desv. (7)
R. stylosa var. *pseudo-rusticana* Crép. (4)
R. virginea Rip. (2)
R. stylosa var. *evanida* Chr. (1)
R. Garroutei Pug. & Rip. (1, 1 ?)
R. parvula Sauz. & Maill. (1)
including *R. seposita* Déségl.

SECT. PIMPINELLIFOLIÆ.

GROUP SPINOSISSIMA.

R. spinosissima Linn. (7)
R. pimpinellifolia Linn. (10, C)
,, var. *rosea* Koch (2)
R. ciphiana Sibb. (1)
R. Ripartii Déségl. (1)
R. mitissima Gmel. (2)
R. rubella Sm. (2)

SECTION PIMPINELLIFOLIÆ HYBRIDÆ.

GROUP PIMPINELLIFOLIÆ × VILLOSÆ.

R. pimpinellifolia (agg.) × *mollis* (agg.) (5 ?)
,, × *omissa* ? (agg.)
,, × *tomentosa* (agg.)
including
R. involuta Sm. (var. *Smithii* Bak.) (3)
R. Sabini Woods (11, I)
R. Doniana Woods (2)
R. gracilis Woods (3, 1 ?)
R. involuta var. *gracilescens* Bak. (I)
,, ,, *Robertsoni* Bak. (2, I)
,, ,, *occidentalis* Bak. (I)
R. Wilsoni Borr. (1, I)
R. hibernica var. *cordifolia* Bak. (1)

GROUP PIMPINELLIFOLIÆ × EU-CANINÆ.

R. pimpinellifolia (agg.) × *canina* (agg.)
including
R. hibernica var. *glabra* Bak. (7)
,, ,, *Grovesii* Bak. (1, I)
R. pimpinellifolia (agg.) × *dumetorum* (agg.)
including
R. hibernica Templ. (3, I)
R. involuta var. *lævigata* Bak. (1, I)
,, ,, *Webbii* Bak. (2)
f. *Margerisoni* W.-Dod (1)
R. pimpinellifolia (agg.) × *coriifolia* (agg.) (2 ?)

GROUP PIMPINELLIFOLIÆ × RUBIGINOSÆ.

R. pimpinellifolia (agg.) × *Eglanteria* (agg.) (3)
  including
    R. biturigensis Bor. ?
    R. involuta var. *Nicholsonii* Crép. (2, 1?)
    ,, ,, *Moorei* Bak. (1, I)

SECTION CANINÆ.

SUBSECTION EU-CANINÆ.

GROUP CANINA.

Subgroup Lutetiana.

R. lutetiana Lém. (8)
R. canina var. *glaucescens* Desv. (1)
R. fallens Déségl. (3, 1?)
R. sphærica Gren. (5)
R. separabilis Déségl. (3)
R. nemophila Déségl. & Ozan. (3, 1?)
R. flexibilis Déségl. (4, 2?)
R. senticosa Ach. (8)
  including *R. aciphylla* Rau
R. mucronulata Déségl. (5)
R. Amansii Déségl. & Rip. (1, 1?)

Subgroup Transitoriæ.

R. insignis Déségl. & Rip. (7, 2?)
R. globularis Franch. (8)
R. rhynchocarpa Rip. (2)
R. canina var. *ramosissima* Rau (1, 1?)
R. syntrichostyla Rip. (3)
R. curticola Pug. (2)
  including *R. oblonga* Rip.

Subgroup Dumales.

R. dumalis Bechst. (11)
  including
    R. cladoleia Rip.
    R. malmundariensis Lej.
R. rubelliflora Rip. (3)
R. leiostyla Rip. (6, 1?)
  including *R. Chaboissæi* Gren.
R. sphæroidea Rip. (4)
R. eriostyla Rip. & Déségl. (2, 1?)
R. recognita Rouy (3)
R. glaberrima Dum. (2)
  including *R. villosiuscula* Rip.
R. viridicata Pug. (9, 1?)
  including *R. analoga* Déségl.
R. Carioti Chab. (2)
R. stenocarpa Déségl. (7)
R. biserrata Mér. (4, 1?)
R. adscita Déségl. (4, 1?)
R. sylvularum Rip. (1, 1?)
  including *R. firmula* God.
R. canina var. *parisiensis* Rouy (3)

Subgroup Andegavenses.

R. andegavensis Bast. (3, 1?)
R. agraria Rip. (6, 1?)
R. Rousselii Rip. (2, 1?)
  including *R. edita* Déségl.
R. litigiosa Crép. (1)
R. surculosa Woods (2, 1?)
R. inconspicua Déségl. (11, 1?, I?)
  including
    R. verticillacantha Mér.
    R. Suberti Rip.
R. Lemaitrei Rip. (1)
R. aspernata Déségl. (2)
R. latebrosa Déségl. (3)
R. canina var. *Schottiana* Ser. (1)

Subgroup Scabratæ.

R. Blondæana Rip. (7)
  including
    R. marginata Bak.
    R. arvatica Bak. p. p.
    R. præterita Rip.
    R. scabrata Crép.
    R. trăchyphylla Gren.
    ,, var. *nuda* Gren.
R. vinacea Bak. (2)
R. Beatricis Burn. & Grem. (4)

GROUP DUMETORUM.

Subgroup Eu-dumetorum.

R. dumetorum Thuill. (5, 1?)
R. submitis Gren. (6)
R. Gabrielis F. Gér. (6, 1?)

R. urbica Lem. (4)
R. semiglabra Rip. (11, 1 ?) including
  R. globata Déségl.
  R. hispidula Rip.
R. trichoneura Rip. (8)
R. platyphylla Rau (4)
R. sphærocarpa Pug. (3)
R. ramealis Pug. (1)
R. jactata Déségl. (4)
R. spinetorum Déségl. & Ozan. (1)

Subgroup Canescentes.

R. canescens Bak. (1)
R. hemitricha Rip. (8, 3 ?)

Subgroup Deseglisei.

R. Deseglisei Bor. (6) including
  R. trichoidea Rip.
  R. Koscinciana auct. angl. non Bess.
R. incerta Déségl. (6, 1 ?) including
  R. Burnati Chr.
  R. imitata Déségl.
R. collina Jacq. (1)

Subgroup Aciculatæ.

R. canina var. *aciculata* Rouy

GROUP GLAUCA.

Subgroup Reuteri.

R. Reuteri God. (9) including
  R. Crepiniana Déségl.
R. intricata Gren. (3) including *R. Reuteri* var. *transiens* Gren.
R. subcristata Bak. (3, 6?, I ?) including *R. complicata* Gren.
R. venosa Swartz (2)
R. stephanocarpa Déségl. & Rip. (1, 1?, I)
R. fugax Gren. (4, 2 ?, I ?)
R. glauca var. *œnensis* Kell. (1)
R. Hailstoni Bak. (1)

Subgroup Subcanina.

R. Reuteri var. *subcanina* Chr. (5, 3 ?, I ?)
R. glauca var. *denticulata* Kell. (2 ?)

GROUP CORIIFOLIA.

Subgroup Coriifoliæ.

R. coriifolia Fr. (3, 1 ?)
R. frutetorum Bess. (4, 1 ?) including *R. coriifolia* var. *subbiserrata* Borb.
R. implexa Gren. (1, 1 ?)
R. Bakeri Déségl. (3, 1?)
R. coriifolia var. *Lintoni* Scheutz (2)
R. celerata Bak. (1)
R. Watsoni Bak. (2, 2 ?)

Subgroup Subcollinæ.

R. cæsia Sm. (2)
R. coriifolia var. *subcollina* Chr. (3 ?)
R. tomentosa var. *obovata* Bak. (1)
R. subcoriifolia Barclay (1)
R. cæsia var. *incana* Borr. (1 ?)
R. pruinosa Bak. (1, 1 ?)
R. Lucandiana Déségl. & Gill. (2)

GROUP TOMENTELLA.

R. Borreri Woods (9) including
  R. inodora Borr. non Fr.
R. tomentella Lém. (10)
  ,, var. *decipiens* Dum. (6)
R. Carionii Déségl. & Gill. (4) including
  R. amblyphylla Rip.
R. sclerophylla Scheutz (1, 4 ?)
R. tomentella var. *Nicholsonii* Chr. (1, 1 ?)
R. caryophyllacea Chr. (3)
R. obtusifolia Desv. (4, 4 ?) including
  R. canina var. *frondosa* Bak.
R. canina var. *concinna* Bak. (1)

SUBSECTION VILLOSÆ.

GROUP POMIFERA.

Subgroup Pomiferæ.

R. pomifera Herrm. (6, 1?)
including *R. recondita* Pug.
R. Grenierii Déségl. (2)

Subgroup Molles.

R. mollis Sm. (13)
R. villosa var. *cœrulea* Woods (10, I)
R. pseudo-rubiginosa Lej. (4)
including
R. arduennensis Crép.

GROUP OMISSA.

R. omissa Déségl. (4)
R. resinosoides Crép. (8, 4?, I)
R. Sherardi Dav. (8, 2?)
R. omissa var. *submollis* Ley (7, 1?, I)
R. tomentosa var. *pseudo-mollis* Bak. fil. (6)
,, ,, *uncinata* Lees (3, 1?)
(*R. farinosa* Bechst. excluded)
R. suberecta Ley (9, 2?, I)
,, var. *glabrata* Ley (2, 1?)
,, × *mollis?* (agg.)(3)
,, × *coriifolia?* (agg.) (1)
R. tomentosa var. *Woodsiana* H. & J. Groves (2)
R. cinerascens Dum. (3)

GROUP TOMENTOSA.

Subgroup Tomentosæ.

R. tomentosa Sm. (7)
R. pseudo-cuspidata Crép. (12)
R. cuspidatoides Crép. (5)

Subgroup Fœtidæ.

R. scabriuscula Sm. (9)
R. fœtida Bast. (11, 1?, I?)
including
R. britannica Déségl. (ined.)
R. confusa Pug. (4)
R. tomentosa var. *sylvestris* Woods (8, 1?)
R. Jundzilliana Bak. (non Bess.) (2)

SUBSECT. RUBIGINOSÆ.

GROUP EGLANTERIA.

R. Eglanteria Linn. (3)
R. apricorum Rip. (4, 1?)
R. comosa Rip. (7)
R. comosella Déségl. & Ozan. (1)
R. rubiginosa var. *rotundifolia* Rau (5, 1?)
R. echinocarpa Rip. (2)
R. Gremlii Chr. (1)
R. jenensis M. Schultze (1)

GROUP MICRANTHA.

R. micrantha Sm. (6, 2?)
including
R. septicola Déségl.
R. permixta Déségl. (6)
R. micrantha var. *trichocarpa* Rouy (3)
R. hystrix Lém. (3?)
R. micrantha var. *Briggsii* Bak. (1)
R. sylvicola Déségl. & Rip. (1, 1?)

GROUP ELLIPTICA.

R. Billietii Pug. (2)
including *R. inodora* Fr.
R. cryptopoda Bak. (1)

GROUP AGRESTIS.

R. agrestis Savi (2, 1?)
including *R. sepium* Thuill.
R. sepium var. *pubescens* Rap. (1)
R. agrestis var. *subcuneata* Rouy (4, I)
including
R. arvatica Bak. p. p.
R. belnensis Ozan. (3, 1?)

ANALYTICAL KEY.

The subdivisions of the subjoined key are lettered in alphabetical order, in capitals for sections and subsections, and in small type for groups and subgroups, to correspond with the letters which follow the names of the sections, &c., after their clavis characters. For the sake of brevity, both in the key and the index which follows it, the names of the species and varieties are given without any indication of their rank, and without authors' name, except where ambiguity might arise from the omission.

Key to Sections and Subsections.

1 Prickles very numerous, of all lengths ... SECT. PIMPINELLIFOLIÆ (C)
Prickles either uniform, or only here and there mixed with acicles, which do not run into the main prickles ... 2

2 Styles combined into a long, glabrous column, longer than the stamens; sepals entire or nearly so... SECT. SYNSTYLÆ (A)
Styles free, or only united into a short column; sepals pinnate ... 3

3 Prickles stout-based, hooked; upper stipules and bracts not much dilated; peduncles long, somewhat hispid-glandular; disc very prominent; stigmas usually in an elongate head ... SECT. STYLOSÆ (B)
Prickles very rarely conspicuously stout-based; upper stipules and bracts greatly dilated; peduncles short or moderate, smooth or hispid-glandular; disc flat or somewhat conical; stigmas in a flattish or hemispherical head ... (SECT. CANINÆ) 4

4 Leaflets with numerous, conspicuous, sticky, scented, subfoliar glands; stems often with acicles below inflorescence or scattered elsewhere ... SUBSECT. RUBIGINOSÆ (G)
Leaflets not glandular, or if decidedly glandular, then stem is without any admixture of acicles ... 5

5 Leaflets glabrous, or if pubescent, then rarely also biserrate or with hispid-glandular peduncles ... SUBSECT. EU-CANINÆ (E)
Leaflets almost always biserrate, densely softly tomentose, or if less so or glabrous, then peduncles hispid-glandular ... SUBSECT. VILLOSÆ (F)

A. SECTION SYNSTYLÆ. (See p. 3.)

1 Leaflets uniserrate ... 2
Leaflets decidedly biserrate ... *biserrata.*

2 Peduncles hispid-glandular ... 3
Peduncles smooth ... *erronea*

3 Stem with short acicles between the main prickles ... *gallicoides.*
Stem without acicles ... 4

4 Leaflets and fruit small, narrow oblong ... *Melvini.*
Leaflets oval*; fruit ellipsoid,* ovoid, or subglobose ... 5

5 Fruit ellipsoid; leaflets usually oval or elliptical ... *ovata.*
Fruit subglobose or ovoid; leaflets oval or broadly so ... 6

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* Throughout this paper and key I have used the words "oval" and "ovoid" to express relatively shorter and broader figures than "elliptical" and "ellipsoid," without intending to imply necessarily any other difference in shape.

6 Petioles considerably glandular .... *scabra*.
Petioles smooth or nearly so 7

7 Plant of normal size; flowers solitary or few in a cluster *arvensis*.
Plant large and stout; flowers usually numerous in cluster... *major*.

B. SECTION STYLOSÆ. (See p. 4.)

1 Peduncles all or almost all quite smooth (see also *evanida*) 2
Peduncles, or at least the majority of them, hispid-glandular 4

2 Leaflets biserrate .... *parvula*.
Leaflets uniserrate 3

3 Leaflets quite glabrous both sides; peduncles all smooth; flowers white .... *virginea*.
Leaflets more or less pubescent, especially beneath; peduncles all smooth; flowers white .... *corymbosa*.
Leaflets glabrous, slightly biserrate; some peduncles slightly hispid; flowers rose .... *Garroutei*.

4 Leaflets decidedly pubescent both sides, rather close set, broadly oval *stylosa*.
Leaflets glabrous above, or nearly so, lanceolate, and spaced 5

5 Large coarse bushes, with large lanceolate or oblong-lanceolate leaflets 6
Small bushes, with smaller oval leaflets...................................... 9

6 Leaflets very coarsely deeply toothed, glabrous or almost so; peduncles strongly hispid-glandular .... *pseudo-rusticana*.
Leaflets not so toothed, hairy on principal veins; peduncles not strongly hispid-glandular; styles often short 7

7 Flowers white.. *leucochroa* Desv.
Flowers rose 8

8 Fruit ovoid .... *systyla*.
Fruit subglobose; leaflets narrower.......................... *lanceolata*.

9 Style-column long; leaflets deeply finely acutely toothed; some peduncles smooth, some weakly hispid-glandular; flowers pale rose .... *evanida*.
Style-column short; leaf-toothing not deep; peduncles all or mostly hispid-glandular; flowers white .... *leucochroa* auct. brit.

C. SECTION PIMPINELLIFOLIÆ. (See p. 7.)

1 Flowers rose.. 2
Flowers white 4

2 Flowers variegated with white .... *ciphiana*.
Flowers uniformly pale rose......... 3

3 Prickles on stem all weak and nearly uniform; fruit urceolate-ovoid, red .... *rubella*.
Prickles very mixed; fruit subglobose, black .... *rosea*.

4 Leaflets biserrate.. *Ripartii*.
Leaflets uniserrate 5

5 Leaflets large and spaced; stem almost unarmed .... *mitissima*.
Leaflets small and close set; prickles and acicles very numerous... 6

6 Peduncles smooth .... *pimpinellifolia*.
Peduncles hispid-glandular .... *spinosissima*.

D. SECTION PIMPINELLIFOLIÆ HYBRIDÆ. (See p. 7.)

Key to Groups.

1 Peduncles hispid-glandular 2
Peduncles smooth ...... PIMPINELLIFOLIÆ × EU-CANINÆ (b)

2 Leaflets eglandular or with many but small subfoliar glands PIMPINELLIFOLIÆ × VILLOSÆ (a)
Leaflets with numerous conspicuous subfoliar glands PIMPINELLIFOLIÆ × RUBIGINOSÆ (c)

a. GROUP PIMPINELLIFOLIÆ × VILLOSÆ. (See p. 8.)

1 Leaflets simply serrate or only moderately biserrate 2
Leaflets strongly biserrate 5

2 Leaflets small, close set, and suborbicular .... *occidentalis.*
Leaflets medium or large 3

3 Leaflets quite uniserrate.. *Wilsoni.*
Leaflets more or less biserrate 4

4 Sepals entire; fruit aciculate .... *involuta.*
Sepals more or less pinnate; fruit usually, not always, smooth *Robertsoni.*

5 Fruit globose, more or less hispid 6
Fruit ellipsoid, smooth.. *gracilescens.*

6 Large prickles decidedly curved; peduncles two, one slender and often drooping; stout bush .... *gracilis.*
All prickles straight or nearly so...................................... *Sabini.*

b. GROUP PIMPINELLIFOLIÆ × EU-CANINÆ. (See p. 9.)

1 Leaflets hairy beneath 2
Leaflets glabrous both sides .... *glabra.*

2 Leaflets uniserrate 3
Leaflets biserrate 4

3 Prickles very numerous, slender, mixed; leaflets hairy both sides; fruit depresso-globose .... *Margerisoni.*
Prickles scattered, mostly uniform, stout, hooked; leaflets hairy only on midribs and primary veins beneath; fruit broadly ovoid *hibernica.*

4 Leaflets quite hairy; sepals entire, glandular .... *lævigata.*
Leaflets quite glabrous above; sepals pinnate, somewhat glandular *Webbii.*

c. GROUP PIMPINELLIFOLIÆ × RUBIGINOSÆ. (See p. 10.)

1 Leaflets small, roundish, obtuse; prickles very unequal, densely mixed .... *biturigensis.*
Leaflets large, elliptical, acute; prickles subequal, mostly large ... 2

2 Leaflets glabrous above, hairy midribs only beneath ... *Nicholsonii.*
Leaflets hairy both sides.. *Moorei.*

E. SUBSECTION EU-CANINÆ. (See p. 10.)

Key to Groups and Subgroups.

1 Leaflets glabrous both sides.. 2
Leaflets hairy, at least on midribs beneath.............................. 7

2 Peduncles usually as long as or longer than fruit; stipules narrow (except uppermost on flowering branches); styles glabrous or hispid, occasionally densely woolly, often projecting above the disc; stigmas in a hemispherical or shortly conical head (GROUP CANINA) 3
Peduncles rarely as long as, usually shorter than fruit; stipules broad, dilated upwards; styles very woolly; stigmas in a flattish head, sessile on the disc ..... (GROUP GLAUCA) 6

3 Leaflets eglandular beneath, except sometimes on midribs..... 4
Leaflets glandular, at least on some of the primary veins beneath, almost always strongly biserrate ..... Subgroup Scabratæ (h)

4 Peduncles smooth 5
Peduncles hispid-glandular..... Subgroup Andegavenses (g)

5 Leaflets uniserrate or very nearly so..... Subgroup Lutetianæ (d)
Lower leaflets of flowering branches more or less biserrate, the upper and most of those on barren shoots uniserrate or nearly so Subgroup Transitoriæ (e)
All leaflets more or less biserrate ..... Subgroup Dumales (f)

6 Sepals erect, or at least rising above the disc, more or less persistent till fruit colours..... Subgroup Reuteri (m)
Sepals reflexed or spreading, but not rising above the disc Subgroup Subcaninæ (n)

7 Peduncles usually as long as or longer than fruit; stipules narrow (except uppermost on flowering branches); styles glabrous or hispid, occasionally densely woolly, often projecting above the disc; stigmas in a hemispherical or shortly conical head..... 8
Peduncles rarely as long as, usually shorter than fruit; stipules broad, dilated upwards; styles very woolly; stigmas in a broad, flattish head, sessile on the disc. ..... (GROUP CORIIFOLIA) 12

8 Prickles always much hooked, usually stout; leaflets usually strongly biserrate, broadly oval or suborbicular, close set, hairy both sides, glandular on at least some of the primary nerves; styles never densely woolly ..... GROUP TOMENTELLA (q)
Prickles curved, or if hooked, rarely stout; leaflets uniserrate or only the lower leaflets of the flowering branches biserrate, rarely all biserrate, eglandular except rarely on midribs beneath (GROUP DUMETORUM) 9

9 Leaflets uniserrate, or only the lower leaflets of the flowering branches biserrate..... 10
Leaflets all biserrate 11

10 Peduncles smooth ..... Subgroup Eu-Dumetorum (i)
Peduncles hispid-glandular ..... Subgroup Deseglisei (k)

11 Peduncles smooth..... Subgroup Canescentes (j)
Peduncles hispid-glandular..... Subgroup Aciculatæ (l)

12 Sepals erect, or at least rising above the disc, more or less persistent till fruit colours ..... Subgroup Coriifoliæ (o)
Sepals reflexed or spreading, but not rising above the disc Subgroup Subcollinæ (p)

d. Subgroup Lutetianæ. (See p. 10.)

1 Middle leaves of flowering branches with large leaflets, 14 lines long or more 2
Middle leaves of flowering branches with medium leaflets, 10–13 lines long 5
Middle leaves of flowering branches with small leaflets, under 10 lines long 7

2 Fruit ovoid or ellipsoid 3
Fruit subglobose .... *sphærica.*

3 Petioles quite glabrous .... *lutetiana.*
Petioles pubescent, though sometimes very slightly........ 4

4 Leaflets glaucous .... *glaucescens.*
Leaflets green, not glaucous .... *fallens.*

5 Styles hispid; leaflets narrowed at each end .... *separabilis.*
Styles glabrous or very nearly so 6

6 Leaflets narrowed at base; flowers white; styles quite glabrous *flexibilis.*
Leaflets rounded at base; flowers rose; styles projecting from a conical disc, sometimes only subglabrous .... *nemophila.*

7 Styles glabrous .... *mucronulata.*
Styles hispid 8

8 Fruit ovoid; flowers rose .... *senticosa.*
Fruit globose; flowers white .... *Amansii.*

e. SUBGROUP TRANSITORIÆ. (See p. 13.)

1 Leaflets large (see last subgroup) 2
Leaflets medium; fruit narrow-elongate, constricted below disc *rhynchocarpa.*
Leaflets small 3

2 Tall, strong bush; leaflets often glaucous; fruit ovoid or ellipsoid *insignis.*
Low bush; leaflets broadly ovoid; fruit subglobose ...... *globularis.*

3 Styles projecting, very woolly; flowers white .... *syntrichostyla.*
Styles glabrous or thinly hispid 4

4 Flowering branches numerous, short, mostly unarmed; flowers rose; styles very thinly hispid .... *ramosissima.*
Flowering branches longer, prickly; flowers white; styles glabrous *curticola.*

f. SUBGROUP DUMALES. (See p. 14.)

1 Leaflets large, or at least long, 14 lines or more 2
Leaflets medium, 10–13 lines long 7
Leaflets small, under 10 lines long........ 10

2 Styles hispid 3
Styles glabrous, rarely slightly hispid 6
Styles woolly, long; fruit globose .... *eriostyla.*

3 Fruit ovoid or elongate 4
Fruit globose .... *sphæroidea.*

4 Leaflets and fruit narrowed at each end........ *recognita.*
Leaflets oval; fruit ovoid 5

5 Flowers rose; leaflets not, or not much glaucous, little biserrate *dumalis.*
Flowers bright rose; leaflets glaucous, especially beneath, considerably biserrate; a large strong bush........ *rubelliflora.*

6 Fruit ovoid; sepals often spreading .... *leiostyla.*
Fruit subglobose .... *glaberrima.*

7 Styles hispid or villous 8
Styles glabrous 9

8 Styles long, hispid or densely so; leaflets sometimes rather small, not much biserrate; fruit broadly ovoid .... *viridicata.*
Styles short, villous; leaflets strongly biserrate; fruit subglobose; sepals often spreading .... *biserrata.*

9 Prickles numerous; leaflets rather broad; fruit ovoid or urceolate; flowers white .... *Carioti.*
Prickles few; leaflets narrow; fruit ellipsoid; flowers rose *stenocarpa.*

10 Fruit ellipsoid or elongate-ovoid; flowers white; prickles many, stout, hooked .... *adscita.*
Fruit subglobose or ovoid.. 11

11 Fruit subglobose; leaflets oval; styles hispid.............. *silvularum.*
Fruit ovoid; leaflets very small, narrowed at each end; styles almost glabrous... *parisiensis.*

g. Subgroup Andegavenses. (See p. 18.)

1 Prickles on the flowering branches mixed with acicles...... *latebrosa.*
Prickles not mixed with acicles 2

2 Leaflets uniserrate or almost so 3
Leaflets decidedly biserrate 7

Styles hispid 4
Styles glabrous or nearly so 5

3 Stems very stout and glaucous; prickles strong, hooked; flowers in clusters; some peduncles slightly glandular, some smooth *surculosa.*
Stems not very stout nor glaucous; prickles straightish; peduncles decidedly glandular, often also fruit .... *andegavensis.*

4 Leaflets broadly oval or suborbicular, often subobtuse...... *Rousselii.*
Leaflets oval or ovate, acuminate.. 6

5 Leaflets large .... *agraria.*
Leaflets small .... *litigiosa.*

6 Styles hispid 8
Styles glabrous .... *Lemaitrei.*

7 Fruit aciculate or strongly hispid; peduncles densely so; styles little hispid .... *aspernata.*
Fruit smooth or slightly and weakly hispid; peduncles slightly and weakly hispid; styles decidedly hispid 9

8 Stem prickly; styles hispid .... *inconspicua.*
Stems often and branches always unarmed or nearly so; styles villous .... *Schottiana.*

h. Subgroup Scabratæ. (See p. 20.)

1 Leaflets large or at least long; styles hispid 2
Leaflets small; styles glabrous or nearly so; fruit subglobose; peduncles smooth .... *Beatricis.*

2 Leaflets broad; fruit subglobose .... *Blondæana.*
Leaflets narrowed at each end; fruit ovoid or ellipsoid ...... *vinacea.*

i. Subgroup Eu-dumetorum. (See p. 22.)

1 Leaflets hairy both sides 2
Leaflets glabrous above 4

2 Fruit subglobose .... *dumetorum.*
Fruit ovoid 3

3 Styles little hispid; petioles unarmed; leaflets decidedly hairy *submitis.*
Styles densely hispid; petioles prickly; leaflets thinly hairy *urbica.*

4 Leaflets uniserrate ... 5
Leaflets irregularly serrate or subbiserrate ... 9

5 Styles hispid or densely so ... 6
Styles thinly hispid ... 8

6 Fruit elongate-ovoid or ellipsoid ... *ramealis.*
Fruit ovoid or broadly so ... 7

7 Leaflets large, suborbicular ... *platyphylla.*
Leaflets medium, oval ... *semiglabra.*

8 Leaflets small; fruit ovoid or subglobose ... *Gabrielis.*
Leaflets large; fruit subglobose ... *sphærocarpa.*

9 Fruit ovoid; leaflets medium, oval ... *jactata.*
Fruit globose; leaflets very large ... *spinetorum.*

j. SUBGROUP CANESCENTES. (See p. 24.)

Leaflets hairy both sides, small ... *canescens.*
Leaflets glabrous above, medium ... *hemitricha.*

k. SUBGROUP DESEGLISEI. (See p. 25.)

1 Leaflets broad, simply serrate, hairy both sides ... 2
Leaflets rather narrow, irregularly serrate, glabrous above ... *incerta.*

2 Prickles hooked or arcuate; peduncles weakly hispid; leaflets rather small ... *Deseglisei.*
Prickles straightish; peduncles aciculate; leaflets large ... *collina.*

l. SUBGROUP ACICULATÆ. (See p. 27.)

Only one variety ... *aciculata.*

m. SUBGROUP REUTERI. (See p. 27.)

1 Leaflets uniserrate ... 2
Leaflets biserrate ... 3

2 Peduncles smooth ... *Reuteri.*
Peduncles hispid-glandular ... *intricata.*

3 Peduncles smooth ... 4
Peduncles hispid-glandular ... 7

4 Leaflets eglandular beneath ... 5
Leaflets glandular on primary nerves ... *stephanocarpa.*

5 Prickles many, running into acicles; styles not very woolly *Hailstoni.*
Prickles uniform ... 6

6 Leaflets medium, oval, acute ... *subcristata.*
Leaflets large, broadly oval, subobtuse ... *venosa.*

7 Leaflets eglandular beneath ... *fugax.*
Leaflets glandular on primary veins ... *œnensis.*

n. SUBGROUP SUBCANINÆ. (See p. 30.)

Leaflets uniserrate ... *subcanina.*
Leaflets biserrate ... *denticulata.*

o. Subgroup Coriifoliæ. (See p. 31.)

1	Leaflets uniserrate	2
	Leaflets irregularly serrate or slightly biserrate	*frutetorum.*
	Leaflets quite biserrate	3
2	Leaflets quite pubescent both sides	*coriifolia.*
	Leaflets hairy only on midribs or also on primary nerves	*implexa.*
3	Leaflets not, or only slightly glandular beneath	4
	Leaflets always glandular on primary nerves	5
4	Leaflets glabrous above, eglandular beneath, rounded at base; petioles thinly glandular; fruit subglobose	*Watsoni.*
	Leaflets hairy above, glandular on primary nerves beneath, narrowed below; petioles very glandular; fruit ovoid	*Bakeri.*
5	Leaflets hairy both sides, oval	*Lintoni.*
	Leaflets glabrous above, small, suborbicular	*celerata.*

p. Subgroup Subcollinæ. (See p. 33.)

1	Leaflets uniserrate or only irregularly serrate	2
	Leaflets quite biserrate	4
2	Leaflets irregularly serrate, close set, small, narrowly elliptical, grey, glaucous	*cæsia.*
	Leaflets quite uniserrate, narrowed base only	3
3	Leaflets medium or rather large, eglandular beneath	*subcollina.*
	Leaflets small, obovate, glandular beneath	*obovata.*
4	Fruit obovoid; sepals strongly reflexed	*subcoriifolia.*
	Fruit elongate-ellipsoid; sepals spreading or loosely reflexed	*incana.*
	Fruit ovoid or broadly so	5
5	Leaflets rather large, oval, rounded below	*Lucandiana.*
	Leaflets rather small, broad, subcordate below, very glaucous	*pruinosa.*

q. GROUP TOMENTELLA. (See p. 35.)

1	Leaflets biserrate	2
	Leaflets uniserrate or nearly so	7
2	Peduncles, at least some of them, hispid-glandular	3
	Peduncles smooth	4
3	Leaflets large and spaced; peduncles usually only slightly hispid; a large, coarse bush	*Borreri.*
	Leaflets small and close set; peduncles usually much glandular or even aciculate	*decipiens.*
4	Leaflets decidedly narrowed at base, hairy and glandular on chief nerves	*sclerophylla.*
	Leaflets broadly rounded at base	5
5	Leaflets with subfoliar glands	6
	Leaflets eglandular	*Carionii.*
6	Leaflets hairy both sides	*tomentella.*
	Leaflets thinly hairy on midribs only	*caryophyllacea.*
7	Peduncles smooth	8
	Peduncles hispid-glandular	*concinna.*
8	Leaflets small, decidedly hairy both sides; prickles hooked, usually stout; flowers white	*obtusifolia.*
	Leaflets large, thinly hairy on midribs only beneath; prickles straightish; flowers rose	*Nicholsoni.*

F. SUBSECTION VILLOSÆ. (See p. 38.)

Key to Groups and Subgroups.

1 Straight-stemmed, low-growing bushes; sepals persistent till decay of fruit; prickles straight; upper stipules on flowering branches with incurved auricles; styles villous 2
Habit intermediate; sepals erect and persistent till fruit ripens; prickles straight or falcate; auricles straight; styles usually villous GROUP OMISSA (t)
Stems flexuose, often tall and arching; sepals spreading or reflexed, deciduous before fruit ripens; prickles falcate or uncinate, more rarely straight; auricles straight; styles hispid or glabrous, rarely villous 3

2 Leaflets very large, subparallel-sided ...... Subgroup Pomiferæ (r)
Leaflets medium, thick, not parallel-sided ... Subgroup Molles (s)

3 Leaflets densely softly tomentose; styles villous or hispid Subgroup Tomentosæ (u)
Leaflets thinly, rarely densely tomentose; styles glabrous or subglabrous, rarely hispid .... Subgroup Fœtidæ (v)

r. Subgroup Pomiferæ. (See p. 38.)

Leaflets 2 in. long, glandular beneath, very parallel-sided, thin; prickles subequal; armature of peduncles and fruit stout *pomifera.*
Leaflets smaller, eglandular beneath, oval; prickles unequal; armature of peduncles and fruit slender .... *Grenierii.*

s. Subgroup Molles. (See p. 39.)

1 Peduncles and fruit, at least at base, smooth, or nearly so *cœrulea.*
Peduncles and fruit always more or less glandular 2

2 Leaflets rather large, thick, softly tomentose, glandular or not, broadly oval; prickles straight or slightly falcate .... *mollis.*
Leaflets rather small, thin, thinly hairy, very glandular, often narrow; prickles very long and straight .... *pseudo-rubiginosa.*

t. GROUP OMISSA. (See p. 40.)

1 Leaflets simply serrate .... *cinerascens.*
Leaflets biserrate 2

2 Leaflets eglandular or rarely glandular except on primary nerves... 3
Leaflets more or less glandular all over lower surface 5

3 Prickles straight or nearly so .... *submollis.*
Prickles decidedly curved or falcate.. 4

4 Fruit normally globose or broadly ovoid; leaflets quite eglandular; prickles more or less curved .... *Sherardi.*
Fruit ovoid or the outer subglobose; leaflets somewhat glandular, at least on primary nerves; prickles uncinate ...... *pseudo-mollis.*

5 Styles hispid; leaflets narrow, subglabrous; fruit ellipsoid *Woodsiana.*
Styles villous; leaflets broader; fruit ovoid or subglobose 6

6 Prickles, or at least some of them, strongly hooked ...... *uncinata.*
Prickles straightish or falcate 7

7 Prickles long, straightish; petioles very prickly and aciculate; sepals long, dark, much pinnate 8
Prickles more or less curved; petioles not strongly armed; sepals green or ashy 9

8 Leaflets tomentose .... *suberecta.*
Leaflets glabrous or nearly so .... *glabrata.*

9 Peduncles as long as or longer than the fruit; leaflets densely glandular; fruit hispid, ovoid or subglobose .... *resinosoides.*
Peduncles shorter than fruit; leaflets thinly finely glandular; fruit smooth or finely hispid, subglobose or obovoid .... *omissa.*

u. Subgroup Tomentosæ. (See p. 43.)

1 Leaflets eglandular or with few, small, inconspicuous glands *tomentosa.*
Leaflets with conspicuous glands, at least on primary nerves 2

2 Leaflets oval, thinly glandular; fruit ovoid; styles hispid; flowers pale rose .... *pseudo-cuspidata.*
Leaflets broadly oval, rather densely glandular; fruit subglobose; styles woolly; flowers bright rose .... *cuspidatoides.*

v. Subgroup Fœtidæ. (See p. 44.)

1 Leaflets softly hairy, at least beneath; styles usually quite glabrous 2
Leaflets subglabrous or thinly hairy beneath; styles often thinly hispid 4

2 Leaflets very large, suborbicular; prickles large and stout *Jundzilliana.*
Leaflets and prickles medium 3

3 Leaflets glandular beneath, rather broad .... *fœtida.*
Leaflets eglandular beneath, rather narrow, often spaced ... *confusa.*

4 Leaflets eglandular; prickles straightish .... *scabriuscula.*
Leaflets decidedly glandular; prickles falcate or subuncinate *sylvestris.*

G. SUBSECTION RUBIGINOSÆ.

Key to Groups.

1 Styles hispid or villous; sepals often erect, usually subpersistent; bushes small, low, stiff, and compact 2
Styles glabrous; sepals reflexed and deciduous; bushes tall, lax, arching 3

2 Stem usually with acicles; peduncles hispid-glandular, very rarely smooth; leaflets small, broadly oval or suborbicular, rounded below .... GROUP EGLANTERIA (w)
Stem without acicles; peduncles smooth; leaflets oblong, narrowed below .... GROUP ELLIPTICA (y)

3 Peduncles hispid-glandular; leaflets oval or elliptical, rarely narrowed below .... GROUP MICRANTHA (x)
Peduncles smooth; leaflets oblong or narrow-elliptical, always decidedly narrowed below .... GROUP AGRESTIS (z)

w. GROUP EGLANTERIA. (See p. 46.)

1 Peduncles smooth .... *jenensis.*
Peduncles hispid-glandular 2

2 Main prickles uniform, or almost so, quite distinct from the acicles, usually hooked, or at least falcate 3
Main prickles considerably unequal, often running into the acicles, straight, or if hooked, not strong 5

3 Flowers white; prickles long, slender .... *Gremlii.*
Flowers rose; prickles stout (*R. Eglanteria* agg.) 4

4 Fruit subglobose; sepals reflexed or spreading, sometimes even erect, but not persistent .... *apricorum.*
Fruit ovoid; sepals usually erect, sometimes spreading, persistent *comosa.*

5 All prickles slender, straightish 6
Prickles very numerous, the larger ones hooked; fruit hispid-glandular or aciculate .... *echinocarpa.*

6 Leaflets about ½ in. long or less, suborbicular; fruit subglobose *rotundifolia.*
Leaflets large, oval; fruit ovoid .... *comosella.*

x. GROUP MICRANTHA. (See p. 47.)

1 Peduncles smooth; leaflets large, broadly oval, only slightly glandular beneath .... *Briggsii.*
Peduncles hispid-glandular; leaflets more or less densely glandular 2

2 Stem with acicles distinct from main prickles, usually just below inflorescence 3
Stem without acicles (except very rarely below inflorescence in *micrantha*) 4

3 Prickles falcate; leaflets small or medium; fruit subglobose, hispid all over .... *trichocarpa.*
Prickles straightish; leaflets large; fruit ovoid or urceolate, hispid at base .... *sylvicola.*

4 Leaflets small, elliptical, wedge-shaped at base; fruit small, subglobose *hystrix.*
Leaflets medium or large, rounded or somewhat narrowed below; fruit ovoid or urceolate 5

5 Flowering branches prickly; fruit usually smooth; leaflets oval, subglabrous, or only slightly hairy beneath .... *permixta.*
Flowering branches unarmed or nearly so; fruit often hispid; leaflets elliptical, pubescent all over beneath, or at least on the primary nerves .... *micrantha.*

y. GROUP ELLIPTICA. (See p. 49.)

Leaflets glabrous above, thinly hairy and finely glandular beneath; fruit subglobose; styles villous .... *cryptopoda.*
Leaflets pubescent both sides, densely glandular beneath; fruit urceolate; styles hispid .... *Billietii.*

z. GROUP AGRESTIS. (See p. 49.)

1 Leaflets glabrous, very small and narrow, not more than 9 by 4 lines, often less, narrowed at each end .... *agrestis.*
Leaflets more or less hairy, at least beneath and on petiole 2

2 Leaflets large, 18 by 12 lines or more .... *pubescens.*
Leaflets medium 3

3 Fruit quite ovoid .... *subcuneata.*
Fruit subglobose .... *belnensis.*

ALPHABETICAL INDEX.

The names of admitted species and varieties are in ordinary type, italics being used for those excluded, and for synonyms.

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